

**INDEPENDENT OVERSIGHT EVALUATION
OF ENVIRONMENT,
SAFETY, AND HEALTH PROGRAMS
AT THE HANFORD SITE**



April 1996

**Office of Oversight
Environment, Safety and Health
U.S. Department of Energy**

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	iii
ACRONYMS AND INITIALISMS	vii
1.0 INTRODUCTION	1
2.0 BASIS FOR EVALUATION	2
Overview of the Hanford Site	2
Evaluation Scope	8
Conceptual Basis for Evaluation	10
Evaluation Rating System	13
3.0 RESULTS	15
Guiding Principle #1 - Line managers are responsible and accountable for safety	16
Guiding Principle #2 - Comprehensive requirements exist, are appropriate, and are executed	21
Guiding Principle #3 - Competence is commensurate with responsibilities	29
Overall Safety Management Program	34
4.0 CONCLUSIONS AND RATINGS	35
APPENDIX A. SAFETY MANAGEMENT CRITERIA EVALUATIONS	
Introduction	A-1
Guiding Principle #1	A-1
Guiding Principle #2	A-10
Guiding Principle #3	A-26
APPENDIX B. EVALUATION PROCESS AND TEAM COMPOSITION	
Evaluation Principles and Criteria	B-1
Evaluation Process	B-7
Team Composition and Responsibilities	B-8

This page intentionally left blank.

EXECUTIVE SUMMARY

SAFETY MANAGEMENT EVALUATION

<u>EVALUATING ORGANIZATION:</u>	Department of Energy (DOE) Office of Environment, Safety and Health independent oversight organization
<u>SITE EVALUATED:</u>	Hanford Site
<u>DATE OF EVALUATION:</u>	January to March 1996
<u>METHODS:</u>	The evaluation selectively sampled various Hanford management systems, programs, facility operations and activities, and engineering systems that are considered essential to worker, public, and environmental safety.

BACKGROUND

The Hanford Site was established during the early 1940s as part of the Manhattan Project. From its inception until the 1990s, Hanford's primary mission was production and separation of plutonium for use in national defense programs. Hanford's current mission is site cleanup and environmental restoration. Ongoing activities include deactivation, decontamination, and decommissioning of facilities associated with former site activities; management and processing of high-level waste; and research and development. Hanford's major facilities include nine deactivated plutonium production reactors, eight of which are in advanced stages of decontamination and decommissioning; chemical separations facilities; high-level waste underground storage tanks; waste management facilities; and laboratories and pilot plants.

There are approximately 14,000 Federal and contractor personnel at Hanford, and the total budget request for fiscal year 1996 is \$1.7 billion. Activities at Hanford are managed by the DOE Richland Operations Office (RL), with programmatic direction provided by the DOE Headquarters Offices of Environmental Management and Energy Research. The major contractors at the Hanford Site include Westinghouse Hanford Company; Bechtel Hanford, Incorporated; Battelle Memorial Institute (responsible for operating Pacific Northwest National Laboratories); Hanford Environmental Health Foundation; and ICF Kaiser.

The potential for high-level waste stored in aging single-shell tanks to leak to the environment and contaminate the groundwater and river systems is one of DOE's highest priority concerns. Other significant hazards at Hanford include buried radioactive and hazardous materials that are leaking to the environment, spent fuel in storage within a few hundred yards of the Columbia River, storage of large quantities of plutonium in forms that are not suitable for long-term storage, facilities that are contaminated and do not meet seismic qualifications, large quantities of hazardous chemicals, construction, decontamination and decommissioning activities, and process operations.

RESULTS

Three guiding principles for safety management formed the basis for the evaluation: 1) line managers are responsible and accountable for safety; 2) comprehensive requirements exist, are appropriate, and are executed; and 3) competence is commensurate with responsibility. These principles, and their associated criteria, represent the template for an effective safety management program.

Principle #1. Line Managers Are Responsible and Accountable for Safety.

Over the last year, RL and its contractors have implemented a number of significant initiatives designed to expedite the reduction of site hazards and to improve the level of environment, safety, and health (ES&H) performance. For example, RL organized the major site activities into five distinct projects, and progress has been made in the cleanup and deactivation of facilities. Strategies have also been identified for the recovery and safe long-term storage of spent fuel and the transfer and stabilization of tank wastes. RL and contractor management have also significantly increased stakeholder involvement in establishing site cleanup priorities and schedules.

Despite this progress, RL is not yet sufficiently engaged in the safety management and oversight of contractor ES&H performance. Problems were evident in defining applicable requirements, policies, and priorities; clarifying roles and responsibilities; responding to contractor submittals and safety questions; monitoring and analyzing safety performance; and establishing individual accountability for ES&H performance.

Hanford Site contractors have identified and communicated management roles, responsibilities, and authorities, although this area will require continuing attention during re-engineering and contract transition activities. Contractors also have many new initiatives under way to improve safety management and performance in such areas as conduct of operations, work planning, radiological protection, and site procedures. Recent significant and avoidable events, however, as well as the potential impact of the many changes taking place at Hanford, indicate a need for greater management attention to achieving individual accountability and disciplined operations. Although the award fee process is moving toward objective criteria, the award fee is based predominantly on mission-related milestones, such as meeting schedules for deactivation activities.

Principle #2. Comprehensive Requirements Exist, Are Appropriate, and Are Executed.

The management of requirements at Hanford by DOE and its contractors has been effective in the past in identifying new and revised external requirements and translating them into implementing policies and procedures in a timely manner. RL and its contractors have also been effective in assuring the continuing implementation of DOE requirements during the transition from the old to the newly revised DOE orders. However, the DOE effort to streamline and revise DOE orders involves development of a "crosswalk" between the old orders and the streamlined new ones. The crosswalk has not been completed, resulting in delays in the transition to the new orders.

Several thousand Hanford Site procedures are currently being upgraded to better reflect external and DOE requirements. However, there are concerns with the procedure validation effort and the level of worker confidence in the procedures. Continuing events and Oversight team observations indicate that some managers, supervisors, and workers have not yet recognized the importance of compliance with approved procedures.

Although enhancements are under way, the authorization bases for several facilities reviewed are out of date and do not reflect current site hazards, conditions, or activities. For example, the interim authorization bases for the tank farms consist of a complex array of numerous documents, making it difficult to effectively support important safety processes, such as hazards analysis and unreviewed safety question determinations. In addition, deficiencies were identified in the processes for upgrading safety analysis reports and technical safety requirements and for resolving safety questions.

Deficiencies identified through various assessment processes are not effectively managed to ensure that adverse conditions are consistently and appropriately captured, prioritized, evaluated for extent of condition and root cause, tracked to timely and proper closure, incorporated into the analysis of trends and generic issues, or used as an effective tool to manage performance. Both RL and its contractors lack structured and effective self-

assessment processes to proactively identify problems and achieve continuous improvement in safety management. A promising exception exists at Pacific Northwest National Laboratories, where RL has placed 25 percent of the performance evaluation on the improvement and implementation of a self-assessment program and has effectively used analysis and assessment to bring about required change.

Principle #3. Competence is Commensurate With Responsibilities.

ES&H staffing levels at the Hanford Site are adequate. The qualifications and the competence of the workforce, however, need to be strengthened. Specific technical skill deficiencies exist within such areas as radiation protection and systems engineering, although both RL and contractors are attempting to recruit external expertise to fill those gaps. Current downsizing efforts with DOE and its contractors represent a considerable obstacle to the success of the efforts to recruit staff with the requisite skills. Further, heightened RL upper-management attention is required to assure successful implementation of the technical qualification programs in response to Defense Nuclear Facilities Safety Board Recommendation 93-3 and to further enhance competency within the Facility Representative program. Dealing successfully with the complex challenges facing the site requires extensive management and system engineering skills. Nationally, there is a strong demand for these skills, and their acquisition and development require a careful strategic approach. Such an approach is not evident at Hanford.

RL and its contractors have been successful in increasing worker involvement and establishing effective ES&H training programs. Workers are increasingly participating in such activities as accident prevention councils, safety committees, and job planning and hazard analysis. Programs and policies, such as employee concerns programs and stop-work authority, are providing the workers with an increased sense of participation and responsibility for safety. The RL training program is well documented and is effective in identifying, locating, and procuring training for Federal employees. Contractor training programs are generally adequate, and the management and operating contractor that conducts most of the training provided at the Hanford Site uses a performance-based approach and provides generally high quality training.

Overall Safety Management Program

RL and its contractors have recognized many of the problems identified during this Oversight evaluation and have taken steps to address them. In the last year, RL and its contractors have brought in managers and staff with extensive industry experience to assist in changing the organizational culture and to provide a more disciplined approach to site activities and safety. Hanford Site contractors have also recently implemented a number of promising new programs and initiatives in such areas as conduct of operations, hazard analysis and work planning, radiological protection, self-assessments, operational excellence, re-engineering, operations improvement, and requirements management. However, these recent initiatives and staffing changes are in the early stages of implementation and are only beginning to have notable impacts on performance. At the time of this evaluation, RL and its contractors have met with only partial success.

Near misses and avoidable accidents that continue to occur, as well as the interviews and observations associated with this evaluation, indicate pockets of continuing resistance to change. Some of this continuing affinity for the old and informal way of doing work appears strongest among the ranks of middle and lower management and supervision—the very individuals who should be setting the example for change and demanding accountability for performance on the part of the workers.

The lack of sitewide operational discipline, effective work planning, and individual accountability is a major contributor to continuing performance problems in programs such as radiological protection. These weaknesses are exacerbated by the current instabilities at the Hanford Site (e.g., downsizing and the pending transition to a management and integrating contractor), which have a detrimental impact on the morale of managers and staff,

and contribute to distractions and decreased attention to detail. When combined with weak corrective action management and self-assessments and a workforce that has not completely accepted the concept of disciplined operations, these instabilities can lead to even more frequent or serious errors, events, and accidents.

CONCLUSIONS

Based on this independent sample, safety management at the Hanford Site is in need of improvement in many areas. Initiatives under way within RL and its contractors have the potential for significantly improving ES&H performance, but will succeed only if increased management attention and presence are brought to bear to assure sitewide acceptance and sustained implementation. RL needs to be more engaged in the management and oversight of ES&H performance, and needs to become more involved in monitoring ES&H performance through onsite observations and more direct involvement in safety management. Both DOE and its contractors need to be more aggressive in achieving disciplined operations and work controls as well as consistent accountability for ES&H performance at every level of management, supervision, and staff. Increased management presence in the field by both RL and contractors is essential to achieving these objectives.

In addition, more aggressive safety management should be accompanied by improved self-assessment capabilities to facilitate early identification of problems and reduce the current excessive reliance on external inspections and findings. Systems for prioritizing and implementing corrective actions need improvement. Further, RL needs to define and prepare for its changing role as the site transitions to a management and integrating contract, including training its managers for their changing roles and responsibilities.

ACRONYMS AND INITIALISMS

ALARA	As low as reasonably achievable
ARM	Authorities and Responsibilities Manual
BCCSR	BCS Richland, Inc.
BHI	Bechtel Hanford, Incorporated
BIO	Basis for Interim Operations
CAIR	Compliance assessment and implementation report
CFR	Code of Federal Regulations
D&D	Decontamination and decommissioning
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
EH	U.S. Department of Energy Office of Environment, Safety and Health
EM	U.S. Department of Energy Office of Environmental Management
ES&H	Environment, Safety, and Health
FAR	Manual of Function, Assignments, and Responsibilities for Nuclear Safety
FFTF	Fast Flux Test Facility
FMEF	Fuel Materials and Examination Facility
FY	Fiscal year
HAMMER	Hazardous Materials Management and Emergency Response Training and Education Center
HEHF	Hanford Environmental Health Foundation
HEMP	Hanford Environmental Management Program
HLW	High-level waste
HVAC	Heating, ventilation, and air conditioning
IH/IS	Industrial Hygiene/Industrial Safety
JCO	Justification for Continued Operations
KEH	ICF Kaiser
M&I	Management and integration
MOU	Memorandum of Understanding
OIP	Operations Improvement Program
OSHA	Occupational Safety and Health Administration
OSR	Occupational safety requirement
PAD	Performance Assessment Division
PBI	Performance based incentives
PFP	Plutonium Finishing Plant
PHA	Preliminary hazards analysis
PHR	Process hazards review
PNNL	Pacific Northwest National Laboratories
POC	Performance objective criteria
QA	Quality assurance
QS&HD	Quality, Safety, and Health Division
RCRA	Resource Conservation and Recovery Act
RDS	Risk data sheets
RL	U.S. Department of Energy Richland Operations Office
SAR	Safety analysis report
SBMS	Standards Based Management System
SDR	Staff development review

S/RID	Standards/Requirements Identification Document
TSCA	Toxic Substances Control Act
TSR	Technical safety requirement
TWRS	Tank Waste Remediation System
USQ	Unreviewed safety question
USQD	Unreviewed safety question determination
VPP	Voluntary protection program
WESF	Waste Encapsulation and Storage Facility
WHC	Westinghouse Hanford Company

INDEPENDENT OVERSIGHT EVALUATION OF ENVIRONMENT, SAFETY, AND HEALTH PROGRAMS AT THE HANFORD SITE

1.0 INTRODUCTION

An independent oversight safety management¹ evaluation of the Hanford Site was conducted from January through March 1996 by the Office of Oversight, U.S. Department of Energy (DOE). The purpose of the evaluation was to determine how well DOE and contractor line management² have implemented safety management and environment, safety, and health (ES&H) programs at Hanford. As used in this report, Hanford and the Hanford Site refer to both the DOE Richland Operations Office (RL) and the contractors who perform work at the direction of RL.

This evaluation was conducted as part of the Department's independent oversight program, which was consolidated in December 1994 under the Office of Environment, Safety and Health (EH) into the Office of the Deputy Assistant Secretary for Oversight. A major objective of the Office of Oversight is to provide the Secretary of Energy; DOE program, field, and contractor managers; the Assistant Secretary for Environment, Safety and Health; Congress; and the public with accurate and comprehensive information on and analysis of the effectiveness of the Department's ES&H programs.

The Hanford Site was selected for review because it conducts unique and diverse hazardous activities. The potential for high-level waste stored in aging single-shell tanks to leak to the environment and contaminate groundwater and river systems is one of the DOE's highest priority concerns. Other significant concerns at Hanford are timely cleanup and safe storage of buried radioactive and hazardous materials that are leaking to the environment; removal of spent fuel from basins that are within a few hundred yards of the Columbia River; storage of large quantities of plu-

The Office of Oversight evaluated safety management programs at the Hanford Site from January through March 1996.

This site's diverse activities present unique challenges to safety management.

¹Safety management refers to those measures required to ensure that an acceptable level of safety is maintained throughout the life of a facility or installation. The term "safety" when used in the context of safety management or the safety management program specifically includes all aspects of environment, safety, and health programs.

²Line management refers to the unbroken chain of command that extends from the Secretary through the Under Secretary to the Cognizant Secretarial Officers, field organization managers, and contractors. Line management consists of DOE and contractor personnel organizationally or contractually responsible for work or job tasks, as well as effective safety.

onium in forms that are not suitable for long term storage; facilities that are contaminated and do not meet seismic qualifications; and mitigation of liquid wastes containing radioactive and chemical contaminants that were discharged to the ground in previous years, and that have produced groundwater plumes that are entering the Columbia River. Large quantities of hazardous chemicals, construction, decontamination and decommissioning (D&D) activities, and process operations also present hazards to workers.

The EH approach to Oversight evaluations is presented in Section 2 of this report, which describes the Hanford facility, the scope of the review, and the guiding principles for safety management that serve as the basis for the evaluation and the ratings. Section 3 presents the most significant inspection results and Oversight's assessment of the effectiveness of the Hanford safety management program, organized according to the guiding principles of safety management. Conclusions and ratings are presented in Section 4.

The report contains two appendices:

- Appendix A presents an assessment of each of the individual criteria and provides detailed results to support the evaluation of the safety management guiding principles presented in Section 3.
- Appendix B provides additional details on the evaluation approach and identifies the members of the Oversight evaluation team.

Appendix A provides important additional details on the results of the evaluation and is targeted toward DOE and contractor personnel who are interested in the detailed results that support the Oversight team's evaluation. Appendix B provides a detailed description of the evaluation criteria, methodology, and process. It contains the full text of the evaluation criteria, which serve as a template for an effective safety management program. It provides important detail for readers who are not already familiar with the guiding principles of safety management and associated criteria.

2.0 BASIS FOR EVALUATION

OVERVIEW OF THE HANFORD SITE

The Hanford Site consists of about 560 square miles located near Richland, Washington. The site is located along the Columbia River in a semi-arid region of the south central portion of the state. The mission of the Hanford Site is environmental restoration. Ongoing activities include deactivation and D&D of facilities associated with former site activities, management and processing of high-level waste, and research and development.

In addition to DOE, Federal, and state requirements, the Hanford Site is governed by the Tri-Party Agreement, which delineates commitments and schedules for environmental remediation of the Hanford Site. The Tri-

The Hanford Site is located near Richland, Washington, along the Columbia River.

Party Agreement is a binding, legally enforceable document established between the DOE, the Environmental Protection Agency, and the State of Washington. It is viewed as a living document that is modified as appropriate through negotiation between the three parties.

The Hanford Site was chosen for the Manhattan Project in 1943 to produce plutonium for the nation's first nuclear weapons. Over a period of fifty years, the Hanford Site produced 67.4 metric tons of plutonium. Plutonium production involved irradiation of fuel in graphite-moderated nuclear reactors, storage of the irradiated fuel until it could be processed, and subsequent separation and purification of the plutonium in a series of chemical processes.

The Hanford Site was established in 1943 to produce plutonium for the Manhattan Project.

Figure 1 shows an overview of the Hanford Site facilities and their historical role in the weapons complex.

As shown in Figure 2, the Hanford Site is divided into several areas, each of which was devoted to specific types of facilities and activities:

- Nine older plutonium production reactors are located in the 100 Areas, which are situated along the Columbia River. All nine reactors have been retired. Eight are in an advanced stage of D&D, and environmental restoration activities are under way at the ninth (N Reactor).
- Chemical processing facilities, including the Purex Plant, B Plant, and the Plutonium Finishing Plant (PFP), are located in the 200 Area. Some of the chemical processing facilities have been deactivated, and others are in transition from operations to deactivation. The 200 Area also contains waste management facilities, including the Waste Encapsulation and Storage Facility (WESF) and the Tank Farms.
- The 300 Area contains laboratories, a deactivated research reactor, technical shops, engineering offices, and support facilities that focus on research and development associated with waste management and energy technologies.
- The 400 Area includes the Fast Flux Test Facility (FFTF), a shut-down sodium-cooled fast flux test reactor, and the Fuel Materials and Examination Facility (FMEF).

Figure 1



Figure 2



To accomplish its mission, RL has delineated five major areas of work, locally referred to as "projects," each of which is directed by one of RL's Assistant Managers. The five projects are:

- Tank Waste Remediation System (TWRS)
- Waste Management
- Facility Transition
- Environmental Restoration
- Technology Management.

The RL Offices of Training and Environment, Safety and Health also play critical roles in the safety management program.

Figure 3 shows a simplified illustration of the RL organizational structure. It identifies the RL Assistant Managers who have responsibility for the programs and facilities reviewed during this Oversight evaluation, and the contractors that are primarily responsible for operating those facilities.

Four contractors are responsible for conducting programs and managing facilities at the direction of RL:

- Westinghouse Hanford Company (WHC) is the contractor responsible for cleanup activities and maintaining and operating most Hanford facilities. WHC facilities reviewed during this evaluation were the Tank Farms, the K-105 Basins, B Plant/WESF, and the PFP.
- Bechtel Hanford, Incorporated (BHI) is the environmental restoration contractor for the Hanford Site. BHI is currently performing restoration activities at the N Reactor, which was reviewed during this evaluation.
- Pacific Northwest National Laboratories (PNNL), which is the research and development center for the site, is operated by Battelle Memorial Institute. PNNL facilities reviewed were Buildings 324 and 325.
- Hanford Environmental Health Foundation (HEHF), which provides site occupational medical services to RL and its contractors.

In addition, as a subcontractor to WHC, ICF Kaiser (KEH) performs all major construction and renovation activities at the Hanford Site. In this role, KEH performs work at facilities managed by PNNL, as well as those managed by WHC.

Approximately 14,000 personnel are employed at Hanford, 542 of whom are DOE employees (as of March 1996) and the rest contractors. The number of contractor personnel employed at the site has

Four contractors manage facilities and programs at the direction of the Richland Operations Office.

Figure 3



been reduced by about 4000 in the past several years, and further reductions in staff are anticipated. The total budget appropriation for fiscal year 1996 is about \$1.7 billion.

EVALUATION SCOPE

The evaluation focused on the following organizations responsible for safety management at the Hanford Site:

- The DOE Office of Environmental Management (EM), the cognizant secretarial office at DOE Headquarters primarily responsible for program development and direction of the activities reviewed during the evaluation
- RL, which is responsible for execution of DOE programs at the Hanford Site
- The three contractors that manage facilities and programs (WHC, BHI, PNNL), the medical services contractor (HEHF), the construction subcontractor (KEH), and various smaller subcontractors that provide support to the contractors.

Implementation of safety management programs was evaluated at selected Hanford facilities. These facilities and their primary functions are:

- Tank Farms - an operational high-level waste management facility for liquid wastes
- K-105 Basins - an operational waste management facility for buried solid waste and spent fuel
- B Plant/WESF - these two facilities share a common building but have different missions: B Plant is a chemical process facility that is in transition to deactivation, and WESF is an operational facility for storing encapsulated cesium and strontium isotopes
- PFP - an operational facility used for various plutonium processing and storage operations that is in transition to deactivation
- N Reactor - a deactivated reactor that is undergoing deactivation (the N Reactor complex is shown in Figure 4)
- Buildings 324 and 325 - Building 324 (also known as the Waste Technology Engineering Laboratory) and Building 325 (also known as the Applied Chemistry Laboratory) are both part of PNNL's research and development complex under RL's technology management project.

The evaluation focused on the responsible Program Office, the Operations Office, and site contractors.

Selected Hanford facilities were reviewed.

Figure 4



In addition, construction activities were also evaluated across the site at various locations where construction, renovation, or disassembly activities were ongoing. Table 1 provides an overview of the work and associated hazards in these facilities.

For each facility, the team conducted vertical reviews to determine the effectiveness of the safety management system in place. The vertical reviews examined selected programs and functional areas, such as radiological protection, waste management, industrial safety, industrial hygiene, process safety, and criticality safety.

The vertical reviews consist of an examination of a functional area that includes a review of policies, management programs and their implementation at selected facilities and process operations. The vertical reviews also include an evaluation of the adequacy of selected procedures, hardware, knowledge and qualifications of personnel on the "shop floor," and engineering systems essential to protection of workers, the public, and the environment, such as ventilation and cooling water.

The results provide useful insight into the effectiveness of the overall safety management program at RL. Evaluation results should be viewed in the context of the scope of the evaluation and the sample of facilities and topics selected for review. Strengths and weaknesses identified during this evaluation may not be representative of all other areas and contractors at RL. Nonetheless, since the facilities and activities selected for evaluation encompass a diverse cross-section of the ES&H program, the Oversight team believes that the facilities selected for review represent a valid sample of overall Hanford ES&H program performance.

CONCEPTUAL BASIS FOR EVALUATION

As a basis for Oversight evaluations of ES&H programs, EH has formulated a conceptual framework that characterizes the principles, programs, and disciplines that are essential elements of a sound safety management program. This approach to oversight is based on the fundamental premise that line managers are responsible for managing safety through proper work planning, hazards analysis, and hazard control. The adequacy of the systems, processes, and procedures that managers use to assure environmental protection and worker health and safety are assessed against a set of clearly defined principles and accompanying criteria. This generic framework can accommodate the wide range of operations, hazards, and management styles at DOE facilities. At the same time, the framework serves as a template against which managers can assess the adequacy of current safety efforts and from which, over time, an understanding of site-specific trends and inter-site comparisons can be drawn.

Vertical reviews of selected programs, functional areas, and systems were conducted.

The review covers a useful cross-section of the safety management program.

The Office of Environment, Safety and Health has developed a conceptual framework for evaluations.

Table 1. Work and Hazards That Were Reviewed at the Hanford Facilities (Page 1 of 2)

Facility (Contractors with Significant Roles)	Nature of Work	Principal Hazards
Tank Waste Remediation System Project		
Tank Farms (WHC)	<ul style="list-style-type: none"> Liquid waste storage in underground tanks Mixing and monitoring tank contents Transfer of tank liquids as needed Evaporation of slurries Major upgrades accomplished in recent years Recognized as one of DOE's highest-priority concerns 	<ul style="list-style-type: none"> Handling and transfer of radioactive liquid wastes Liquid wastes are both radioactively and chemically hazardous Aging single-shell tanks can leak to the environment Some tanks have flammable organics and ferrocyanide mixtures or generate hydrogen and heat which could cause tank failure or dispersal of materials Aging and inadequate piping must be used for transferring liquids to control/prevent leaks to the environment
Waste Management Project Facility		
K Basins (WHC)	<ul style="list-style-type: none"> Storage of irradiated fuel until it can be moved to a safer location or permanently disposed Operation of cooling water systems and transfer of accumulated sludge Ongoing D&D in unused buildings Secondary mission of raising salmon for release to the Columbia River 	<ul style="list-style-type: none"> Over 2100 metric tons of highly irradiated spent reactor fuel stored Aging facilities have exceeded design life by 25 years Fuel degrading has resulted in radioactive sludge at bottom of basin Basins have leaked in past and may do so again due to age and condition (facility is 400 yards from Columbia River)
Facility Transition Project Facilities		
B Plant/WESF (WHC)	<ul style="list-style-type: none"> B Plant formerly used for chemical separations of irradiated fuel and later for separation of cesium and strontium isotopes from the waste stream B Plant not used since 1985 and is in transition to deactivation WESF formerly used to encapsulate strontium and cesium WESF now used for safe storage and stewardship of capsules (over 2000) 	<ul style="list-style-type: none"> Residual radiological contamination High energy steam and electric shock (aging facilities and infrastructure) High radiation hazards associated with strontium and cesium capsules
Plutonium Finishing Plant (WHC)	<ul style="list-style-type: none"> Formerly used to process and purify plutonium nitrate, reduce nitrate to metal, and fabricate metal parts Currently used for diverse plutonium processing, handling, and storage 	<ul style="list-style-type: none"> About 25 metric tons of plutonium-bearing materials, including solutions Also special nuclear material in the form of Pu-239 and U-235 Other transuranics such as Am-241 Significant quantities of highly radioactive, hazardous chemicals and mixed waste, some of which is in dispersable forms

Table 1. Work and Hazards That Were Reviewed at the Hanford Facilities (Page 2 of 2)

Facility (Contractors with Significant Roles)	Nature of Work	Principal Hazards
Environmental Restoration Project Facilities		
N Reactor (BHI)	<ul style="list-style-type: none"> Formerly used for production of plutonium and at one time for electric power production Now undergoing environmental restoration, and associated deactivation activities 	<ul style="list-style-type: none"> Disassembly hazards and typical construction hazards (e.g., power tools, hoisting, rigging, scaffolds, machinery, explosives, confined space, industrial chemicals) Work is potentially particularly hazardous because of aging facilities, conditions that are not fully characterized, and unpredictable hazards
Technology Management Project Facilities		
Building 324/ Waste Technology Engineering Laboratory (PNNL)	<ul style="list-style-type: none"> Research and development (typically 30 to 50 projects ongoing) Specially shielded, ventilated and equipped laboratories and hot cells High-level radioactive chemical processing, metallurgical engineering studies, and non-radioactive waste treatability pilot studies 	<ul style="list-style-type: none"> Contaminated facilities Cutting and machining of nuclear materials Hazardous metals Fires in hot cells Hydrogen buildup and explosions Spent reactor fuel in hot cells Dispersable radioactive materials Very high indication areas Highly contaminated areas Potential for criticality because of the quantity of special nuclear material Aging electrical and air sampling equipment Hazards may vary with the nature of ongoing experiments
Building 325/ Applied Chemistry Laboratory (PNNL)	<ul style="list-style-type: none"> Research and development (typically 30 to 50 projects ongoing) Laboratories and hot cells High-level radioactive chemical process development Treatment, storage and disposal of hazardous radioactive and non-radioactive waste Analyses and nuclear process development studies Laboratory and pilot plant scale nuclear-related processes, such as recovery of Y-90 for medical purposes, spent fuel support, and waste treatment 	<ul style="list-style-type: none"> Multi-Curie quantities of radioactive materials Small inventories of over a thousand hazardous chemicals (e.g., acids) Very high radiation areas Highly contaminated areas Potential for criticality because of the quantity of special nuclear material Dispersal of material to environment after fire or earthquake Aging electrical and air sampling equipment Facility does not meet current seismic codes
Construction Activities		
Sitewide (KEH)	<ul style="list-style-type: none"> Construction Disassembly Demolition Renovation and repair 	<ul style="list-style-type: none"> Typical construction hazards (e.g., power tools, hoisting, rigging, scaffolds, machinery, explosives, confined space, industrial chemicals) Work is potentially particularly hazardous because of aging facilities, conditions that are not fully characterized, and unpredictable hazards

The conceptual framework centers around three of the five fundamental management principles³ identified by DOE in an October 1994 letter to the Defense Nuclear Facilities Safety Board (DNFSB). The letter included a comprehensive description of the functions that the Department deems necessary to fulfill its mandate under its enabling legislation to provide "reasonable assurance that the safety and health risk of operating personnel and the public be minimized."

The three applicable fundamental principles for an effective safety management program and the applicable evaluation criteria are shown in Table 2. These principles are discussed in more detail in Appendix B, which includes the full text of the criteria.

The framework centers on three fundamental safety management principles and associated criteria.

An overall view of the process for evaluating the effectiveness of the implementation of each guiding principle and the overall Hanford Site safety management program is depicted in Figure 5.

EVALUATION RATING SYSTEM

The basis for the assigned ratings reflects the criteria identified in the template summarized in Table 2. These criteria are considered necessary to implement Secretary's principles for establishing an

³Five guiding principles are identified in the DOE's letter: line management responsibility for safety, comprehensive requirements, competence commensurate with responsibilities, independent oversight, and enforcement. The last two are performed by the Office of Oversight and other Departmental elements. The evaluation of the Hanford Site, therefore, focused on Hanford's effectiveness in implementing the first three of the five guiding principles, which are directly applicable to line management.

Table 2. Guiding Principles and Criteria for Evaluating Safety Management

Principle	Criteria
#1 - Line managers are responsible and accountable for safety.	1-1: Clear Safety Policies and Goals 1-2: Defined Responsibilities and Authorities 1-3: Project and Resource Management 1-4: Line Management Accountability for Performance
#2 - Comprehensive requirements exist, are appropriate, and are executed.	2-1: Requirements Management 2-2: Hazards Analysis 2-3: Implementation of Requirements 2-4: Assessment Programs
#3 - Competence is commensurate with responsibilities.	3-1: Staffing and Qualifications 3-2: Technical Competence and Knowledge of Hazards 3-3: Worker Participation and Empowerment 3-4: Training Programs

Figure 5



effective safety management system, with the criteria in the template representing the Department's standard. The template represents an analytical framework designed to provide a professional approach to oversight that adds value to management decisions; it does not simply list examples of non-compliance with DOE requirements. The template was designed to promote the mature, professional judgment, reflecting the Secretary's principles, that will achieve Oversight's objectives.

The ratings for each of the guiding principles and the safety management program are graphically represented using a color rating scheme. The colors and their meanings are as follows:

Red:	Significant weakness
Yellow:	Improvement needed
Green:	Effective performance.

This color rating system is not intended to provide a relative rating between specific facilities or programs at different sites because of the many differences in missions, hazards, facility life cycles, and use of sampling techniques.

A "green" rating denotes "effective performance." This rating reflects effective implementation of the Department's standards for an effective safety management program (the template with its associated criteria). Although some deficiencies or issues may have been identified during an evaluation, a green rating is appropriate if those deficiencies or issues do not degrade the overall effectiveness of the program.

A "yellow" or "red" rating indicates that one or more of the Department's standards are not met and that improvement is needed, with a red rating indicating that the identified weaknesses are significant and require prompt attention.

3.0 RESULTS

This section summarizes the results of the Hanford Site safety management program review for each of the three guiding principles, as delineated in Section 2. Following the discussion of the three guiding principles, the overall effectiveness of the Hanford Site safety management program is discussed; the focus of this discussion is on how well the safety management program functions to achieve its ultimate objective of protecting workers, the public, and the environment.

The rating system uses colors as a visual summary of performance.

Guiding Principle #1 - Line managers are responsible and accountable for safety.

Hanford Site line management faces many significant challenges in managing high- and low-level wastes, stabilizing hazardous materials, deactivating facilities and performing environmental restoration activities in a manner that is both cost effective and safe. These challenges include downsizing and a loss of experience, funding reductions, facility mission changes and deactivation, re-engineering and decentralization, prioritization and increasing use of subcontractors, onsite competition for the new contract, and a pending transition to an integrating contractor.

Both RL and its contractors recognize that their past performance has not met expectations, and have committed to a number of initiatives designed to improve both safety management and mission performance. To this end, RL has reorganized its activities according to its five major projects. RL has also focused on contract reform (e.g., transitioning to objective performance measures), improving relations with stakeholders and the transition to a managing and integrating contractor. Contractors have demonstrated their commitment to enhanced safety management through a variety of measures, such as increased support for safety councils and implementation of a variety of programs, including WHC's re-engineering effort and PNNL's operations improvement program. Concurrently, both RL and its contractors have focused on improving relations with workers and unions on matters related to safety.

Much of RL's focus has been on improved management of the efforts to reduce hazards at the Hanford Site, and they have had considerable success in this area. During the past year, RL has identified a "path forward" for two longstanding problems (spent fuel and waste tanks) and made considerable progress in deactivating facilities and decontaminating site areas. Much of the success in these endeavors can be attributed to the reorganization of site activities according to the five projects and the related focus on mission accomplishment, and to contract reform efforts, such as privatization of some hazard reduction activities and increasing use of objective performance measures in award fee determinations.

The improvement in the ongoing effort to transitioning facilities to a deactivated status is particularly notable because it helps achieve two critical goals—reducing hazards and reducing operational and maintenance costs. As shown in Figure 6, deactivated facilities involve fewer hazards and require fewer resources to maintain. RL and its contractors have made progress in the cleanup and deactivation of facilities such as Purex, the Uranium Oxide Plant, and the N Reactor. At the N Reactor, which was reviewed during this Oversight evaluation, RL and its environmental restoration contractor, BHI, have completed more than 75 percent of scheduled deactivation activities

Hanford Site line management faces many significant challenges in achieving its mission in a manner that is both cost effective and safe.

The Operations Office and its contractors have committed to a number of initiatives designed to improve both safety management and mission performance, including a reorganization according to five projects.

The Operations Office's recent efforts have reduced site hazards.

The deactivation efforts at N Reactor have been accomplished effectively.

Figure 6



and anticipate completion ahead of the milestone agreed upon under the Tri-Party Agreement. Although some issues (facility classification, waste material surveillance, and radiological control procedural compliance) need to be resolved, RL and its contractors have been effective in planning and implementing the deactivation of the N Reactor safely and effectively. The effort was characterized by effective interfacing among RL, BHI, and BHI subcontractors to resolve day-to-day operational issues, and the desire to integrate their tasks and activities efficiently toward a common goal.

RL has also had considerable success in strengthening and improving its relationship with stakeholders. Most notably, RL management is increasing community involvement, improving coordination with external regulators, and effectively conveying the basis for complex management decisions through its direct involvement with the Hanford Advisory Board, which consists of representatives of DOE, contractors, and various stakeholders (e.g., unions, state and Federal agencies, Indian nations, and public interest groups) and was formed to provide advice on priorities and policies at the Hanford Site. For example, stakeholders actively participate in the budget prioritization process by evaluating risk data sheets and reviewing environmental permit requests and associated grant actions.

Although there have been accomplishments, RL and its contractors fall short in a number of areas necessary to assure that line management understands and implements its responsibility for safety. Most importantly, RL and contractor line management have not yet been successful in achieving the desired level of operational discipline, work control, and ES&H performance that permeates the sitewide workforce. Unnecessary events and accidents that continue to occur (discussed further under Guiding Principle #2), as well as the interviews and observations associated with this evaluation, indicate pockets of continuing resistance to change and disciplined conduct of operations. Some of this continuing affinity for the old and informal way of doing work appears to be among the ranks of middle and lower management and supervision—the very individuals who should be setting the example for change and demanding accountability for performance on the part of the working staff.

Safety Policy and Goals. RL has generally been effective in establishing environmental cleanup and sitewide risk reduction goals and policies. Safety and health policies and goals have also been established in documents such as the Hanford Strategic Plan, although RL management has not been sufficiently involved in articulating and communicating safety and health policy and goals.

Project and Resource Management Systems. RL has implemented some effective initiatives. For example, priorities for budgeting annual task assignments through risk data sheets explicitly recognize site hazards. In addition, PNNL's structured trend analyses have improved operations, and integration of radiological engineering functions has improved radiological work procedures.

The Operations Office has also had considerable success in improving its relationship with stakeholders and increasing community involvement.

Operations Office and contractor line management have not been successful in creating an organizational culture that is conducive to safety.

The Operations Office has established environmental cleanup and risk reduction goals.

The Operations Office budget process explicitly recognizes site hazards.

The Operations Office and its contractors have not adequately addressed some essential elements.

Although RL and its contractors have made improvements, additional improvement is warranted in some areas. For example, prioritization of issues and corrective actions lacks structure and consistency, and RL ES&H organization matrix support to the line is inconsistent and often performed "remotely" or off site.

RL has not adequately addressed the other two criteria under this principle (i.e., roles and responsibilities, and organizational and individual accountability for safety performance).

Roles and Responsibilities. There are a number of specific weaknesses in RL's definition and execution of roles and responsibilities:

- Organizational ES&H responsibilities and authorities for RL managers are addressed in the RL Authorities and Responsibilities Manual (ARM). However, detailed ES&H roles and responsibilities for RL managers and staff are not well defined, documented, or effectively communicated in many cases.
- RL has not provided adequate direction in a number of areas, including the occupational health and medical surveillance program and categorization of facilities (e.g., N Reactor).
- RL line management and ES&H staff have not established a consistently strong presence at the Hanford facilities and, accordingly, are not sufficiently involved in monitoring and controlling contractor performance.

In addition, RL has not analyzed the changes in roles and responsibilities for its staff that may occur as the site transitions to a management and integrating contractor.

Accountability. RL does not have effective mechanisms to hold its managers and supervisors accountable for ES&H performance. RL has used the award fee process to hold contractors and subcontractors accountable for events, adverse ES&H performance, and non-compliance with requirements. However, the current award fee process focuses primarily on contractual task-related milestones, such as accomplishing activities as planned, on schedule, and within budget; ES&H performance is not a predominant performance component in the RL award fee process. A promising exception exists at PNNL, where RL has placed 25 percent of the performance evaluation on the improvement and implementation of a self-assessment program and has effectively used analysis and assessment to bring about required change.

The Operations Office has not adequately defined roles and responsibilities.

Individual and organizational accountability for performance requires further improvement.

In general, contractors have made significant steps toward establishing the framework of a program through recent efforts to establish goals and policies and define roles and responsibilities, and have begun to address individual accountability, particularly with the upper levels of management. WHC, PNNL, BHI, and KEH management have established corporate ES&H policies and goals consistent with the RL Hanford Strategic Plan and clearly communicated them to their managers and workers. ES&H roles and responsibilities for Hanford Site contractors are generally well defined, documented, and effectively communicated. With few exceptions, contractor managers and workers understand corporate policies and goals and their assigned duties for ES&H, are cognizant of site hazards, and recognize that they are accountable for ES&H performance. Formal mechanisms are used to communicate these responsibilities, including sitewide charters, facility-specific safety manuals and plans, discipline-specific procedures manuals, and general safety rules. Contractor senior management support to and engagement in ES&H is pronounced. The WHC re-engineering and work planning pilot projects and PNNL's standards-based management and comprehensive self-assessment are positive initiatives; RL has worked with the contractors to implement these initiatives.

Although recent contractor initiatives have generally been effective, contractors must enhance accountability for ES&H performance through rewards and sanctions for individual ES&H performance, increased adherence to procedures, and lower tolerance for non-compliance. Contractors have established systems for addressing manager, worker, and subcontractor accountability for ES&H performance. However, implementation of these systems is not consistently strong. Despite a sense of facility ownership displayed by many contractor personnel, deviations from approved policies, procedures, and work control mechanisms continue, and effective corrective measures are not consistently applied to achieve accountability and operating discipline. Further, increased contractor management presence in the field and training in root cause analysis and event reporting are needed. In addition, RL and its contractors need to improve analysis of events and performance indicators, prioritize issues and corrective actions sitewide, and improve communications and coordination.

In summary, RL and its contractors have made significant progress in some areas, particularly in the past year. However, further improvement is needed to assure that line management at all levels fully understands, accepts, and implements its responsibility for safety. The most fundamental challenge facing Hanford Site line management will be to sustain current efforts and take other actions necessary to develop a safety-conscious organization and a workforce that embraces such concepts as effective work planning, rigorous conduct of operations, and strict procedural compliance. To accomplish this goal, RL needs to improve its leadership and take a more active role in safety management, Hanford contractors need to increase accountability for ES&H performance and improve analysis and corrective actions, and both RL and contractors need to increase management presence in the field to observe, coach, and correct performance. Effectively determining and communicating the DOE role

Contractors have generally established effective corporate policies and goals.

Contractors must enhance accountability for environment, safety, and health performance.

The Operations Office and its contractors have made significant progress. Improvement is needed to assure that line managers fully understand, accept, and implement their responsibility for safety.

becomes even more important as Hanford transitions to a management and integrating contractor.

Guiding Principle #2 - Comprehensive requirements exist, are appropriate, and are executed.

Many aspects of the Hanford Site requirements management program are in transition. Most notably, WHC is implementing a requirements based-management system based on the standards/requirements identification document (S/RID) process, and PNNL is implementing the Standards Based Management System (SBMS). SBMS is a new, integrated requirements management system process that addresses the all requirements applicable to PNNL; it identifies requirements unique to laboratory operations and includes an analysis of hazards.

In addition, RL and its contractors recognize that several facility authorization basis documents no longer adequately reflect current conditions and operations, and that many facility implementing procedures remain to be upgraded. The lack of current and accurate authorization basis documents for some Hanford nuclear facilities that must comply with current DOE orders and standards has been an acknowledged, ongoing issue since the issuance of these DOE directives in 1992. RL and the contractors, as well as external bodies, have conducted numerous assessments of the authorization basis documents and related programs, including close scrutiny by the DNFSB, especially with regard to the Tank Farms. While there have been historical problems with RL's management of authorization basis submittals and approvals, RL has embarked on a renewed and concerted effort to correct these sometimes longstanding deficiencies. For example, the authority for review and approval of TWRS authorization bases has been retained by Headquarters out of concern for RL's capabilities in this area.

Currently, RL and its contractors are in the midst of a major effort to enhance its hazards analysis. New and updated safety analysis reports (SARs), operational safety requirements (OSRs), and technical safety requirements (TSRs) are in various stages of development. In addition, RL and WHC have implemented a major effort to review and upgrade several thousand procedures across the site and to verify those procedures against the defined requirements.

Concurrent with the analysis process, RL and its contractors are focusing on reducing hazards. The ongoing hazard identification and reduction initiatives have resulted in demonstrable success in some areas. For example, the effort at B Plant/WESF has reduced the number of process chemicals and hazardous materials from 1,500 to 304 over the past two years, and Hanford has made significant progress in stabilizing outdoor radiological contamination. In addition, Hanford has implemented sitewide corrective actions for specific concerns, such as the efforts to mitigate or prevent condensate-induced steam water hammer, which have included modification of steam system piping, development of a procedure that

Key elements of the Hanford Site requirements management program are in transition.

The Operations Office and its contractors recognize that some problems with the authorization basis and procedures remain in some facilities.

A major effort to enhance hazards analyses and procedures is under way.

Hazard reduction efforts are under way, and some success is evident.

clearly addresses water hammer hazards, and formal training for operators. The water hammer effort has produced a nationally recognized program, succeeded in reducing site water hammer hazards, and raised site personnel's awareness of this hazard.

In addition to the hazard reduction efforts, other aspects of the Hanford Site safety management program are effective with respect to this guiding principle:

- The requirements management system at Hanford has been generally effective in identifying new and revised external requirements and translating them into implementing policies and procedures in a timely manner. Externally imposed environmental requirements are effectively captured, evaluated, and translated into implementing procedures and working documents through the Hanford Environmental Management Program (HEMP), which is managed by RL and WHC. A similar, but less formal, process is in place for managing requirements specified by the Occupational Safety and Health Administration (OSHA).
- The RL Facility Representative program is effective in monitoring and enhancing operational performance at most facilities reviewed, although effectiveness at PNNL is limited by a number of factors.
- RL and its contractors have implemented enhanced work planning initiatives, individual safety and health professional surveillance, and worker-driven Accident Prevention Councils. For example, work planning at PFP, B-Plant, and WESF is a team effort that includes maintenance planners, craftspeople, cognizant engineers, and active involvement by industrial safety/industrial health staff to provide hazard evaluation and control.

Ongoing initiatives have had a demonstrated positive impact on worker safety and health at Hanford. For example, there has been a significant reduction in occupational injury and illness rates and lost workdays over the past two years.

Although there are some positive aspects, the Hanford Site safety management program requires improvement in each of the criteria under this principle (i.e., processes to identify, communicate, implement, and monitor applicable requirements; current hazards analyses; fully implemented requirements; and continual assessment of performance). The following paragraphs summarize the weaknesses associated with each of the four criteria.

Requirements Management. RL and its contractors have systems in place to manage DOE requirements, but their effectiveness is diminished because of the current uncertainty within DOE Headquarters and between Headquarters and RL concerning the status of the streamlined DOE order system. Currently, contractors remain bound by their existing contracts to the old orders, although RL has transmitted some of the new orders for implementation. Contractors have requested contract modifications to

The requirements management system is generally effective for external requirements.

The Facility Representative program is effective at most facilities.

Improvement is needed in each of the applicable criteria.

Otherwise adequate requirements management systems are impacted by uncertainty within Headquarters and between Headquarters and the Operations Office concerning the status of the streamlined Department system of orders.

reflect the new orders, but RL cannot concur until Headquarters takes the requisite actions, such as issuing the "crosswalk" between the new and old orders. This situation has left contractors at the site lacking in guidance and leadership from DOE, and has contributed to inconsistent understanding of what requirements are applicable.

As a result, Hanford is experiencing a situation where it is not clear what requirements apply, creating the potential for not implementing requirements. In some cases, different contractors at the same facility are not bound by the same requirements. This is evident, for example, when WHC and KEH personnel are working on the same activity at the tank farms.

In addition, Hanford has experienced difficulties in the transition to S/RIDs. For example, completed WHC S/RIDs have not captured all requirements and have not been independently validated, and PNNL's S/RIDs for Buildings 324, 325, and 327 (committed to by DOE in the DNFSB 90-2 Recommendation Implementation Plan) have not been implemented or funded. The SBMS process has been proposed by PNNL and the cognizant RL Assistant Manager as an alternative to S/RIDs. RL's reviews failed to identify these errors. Further, some activities in sitewide requirements management have lacked rigor and formality with regard to procedures and documentation. For example, most S/RIDs did not have independent validation of source documents and requirements, as required by quality assurance orders and rules regarding nuclear safety-related requirements determinations.

Hazards Analysis. Although progress and many improvements have been made, much remains to be done to bring the hazard analysis and authorization basis documents at Hanford up to date and into compliance with requirements and DOE expectations. Further, RL has not managed the sitewide authorization basis upgrade efforts effectively. Specific areas where problems were identified included SAR maintenance and upgrades, OSR implementation, and the application of the unreviewed safety question (USQ) process. For example:

- The new PFP SAR does not address worker safety elements as required by DOE Order 5480.23.
- The list of B Plant authorization basis documents in the current authorization basis has not been approved by RL.
- The Plant Review Committee at B Plant/WESF are performing analyses of potential USQs prior to final USQ evaluation decisions.
- The current accumulation of documents comprising the Tank Farms' authorization basis is cumbersome and confusing.
- Worker safety requirements contained in DOE Orders 5480.22 and 5480.23 (which address SARs and TSRs) have not been adequately addressed in most existing hazards analyses.

The transition to the standards/requirements identification process has experienced some difficulties.

Authorization basis documents do not reflect current site hazards, conditions, or activities.

- The baseline workplace hazards reviews are not comprehensive or current.

There are also instances where DOE Headquarters (EM and the Office of Energy Research) actions and inactions have hindered the effectiveness of safety management programs. For example, DOE Headquarters (EM and the Offices of Defense Programs and Energy Research) and RL have not clearly defined facility/program ownership, have not provided clear expectations for authorization basis documentation submittals, and have not performed timely reviews of the documents once they were submitted. Improvements are needed in the USQ process and control of OSRs. More fundamentally, however, RL and DOE Headquarters management and direction need to be improved to include a better identification of DOE roles, responsibilities, and authorities for hazard analyses processes.

Implementation. A number of inadequacies were identified in the implementation of requirements at Hanford, specifically deficient procedures and failure to follow procedures. Recent events, as well as team observations, indicate a continuing propensity to deviate from the prerequisites, action steps, and warnings. On several occasions, personnel were observed to deviate intentionally from written procedures. Of even greater concern was that supervisors and managers were aware of these deviations and, in fact, participated in the decisions to deviate without following appropriate procedures for deviating from procedures. Events that occurred during the Oversight evaluation and observations by the Oversight team illustrate the non-compliances and weaknesses; examples include failing to hold an adequate pre-job meeting, performing steps not contained in the procedure, skipping steps, performing steps out of sequence, not complying with procedural prerequisites and warnings, and performing activities in a manner different than specified in the procedure.

Although WHC has implemented a major effort to review and upgrade procedures across the site and much progress was apparent, procedure verification/validation activities associated with the upgrade effort are not sufficiently rigorous to ensure technical and administrative adequacy, as evidenced by the deficiencies identified in new and revised procedures. Procedures were often unclear and had technical errors. Personnel who used the procedures indicated that they did not have confidence in the procedures or the qualifications and experience of the personnel who developed them. Consequently, they often felt justified in relying on their own experience rather than on approved procedures. Similar problems were evident at PNNL facilities: some PNNL personnel do not fully understand or implement conduct of operations principles and requirements, PNNL management has not established an effective policy for procedure adherence, and procedures are not always prepared, verified, validated, or implemented as required. Effective quality control over procedures, including full validation, is a prerequisite to establishing user confidence and verbatim compliance.

Non-compliance with requirements was not limited to specific facilities or organizations. Rather, deficiencies were noted in most contractors' operations, indicating that the problems are sitewide rather than isolated

Operations Office and Headquarters management and direction must be improved to include a better identification of Departmental roles, responsibilities, and authorities.

Recurring issues in procedure compliance were identified.

Procedure verification and validation activities are not sufficiently rigorous.

Non-compliances can have significant safety impacts.

instances. Some of the events that occurred have significant safety ramifications. For example:

- A cask containing irradiated fuel samples at PNNL was not properly labeled or locked to prevent access, creating the potential for worker access to high radiation fields in excess of approximately 25 rem/hr.
- At WHC, lack of adequate planning at B Plant resulted in a greater than necessary whole body dose to a worker.
- Work conducted outside the scope of a radiological work permit resulted in a greater than expected dose to a worker's extremities at the Tank Farms.

The actual and potential overexposure events discussed above and those that occurred during the evaluation are typical indicators of prevalent weaknesses in work planning, adherence to procedures, individual accountability for performance, and timely corrective actions. Selective compliance, including omission of precautions, limitations, warnings, and some steps, contributes to unnecessary and repetitive events and accidents. As discussed under Guiding Principle #1, weaknesses in leadership, direction, and individual accountability for procedure compliance among RL and contractor managers, supervisors, and workers are contributing factors.

Table 3 provides an overview of the positive attributes and areas requiring improvement in each of the ten implementing programs reviewed. Based on the data gathered during this evaluation, some programs, such as waste management, criticality safety, construction

Weaknesses in work planning, adherence to procedures, individual accountability for performance, and timely corrective actions contribute to recurring non-compliances.

Five of ten implementing programs require improvement.

Table 3. Summary of Implementing Programs (Page 1 of 2)

Positive Attributes	Weaknesses and Potential Concerns
Process Safety	
<p>B Plant/WESF, PFP, and K Basin are implementing comprehensive liability reduction programs to reduce and stabilize existing inventories of hazardous and nuclear materials.</p> <p>WHC's B Plant Facility Hazards Analysis and K Basin Safety Basis (SAR & OSR) preparations utilized an extensive hazards analysis process for identification and accident analysis.</p>	<p>The S/RID process used at K Basin, Tank Farm, PFP, and B Plant/WESF lacks independent verification.</p> <p>The authorization basis process is not being maintained and implemented at PFP, B Plant/WESF, and Tank Farms in accordance with DOE and facility requirements; however, a major effort is in process at Tank Farms to update their interim safety basis and develop a near-term basis for interim operation and final SAR.</p>
Essential Systems	
<p>Maintenance work planning at B Plant and WESF is a team effort that includes the maintenance planners, craftspeople, cognizant engineers, and appropriate safety reviewers.</p> <p>B Plant and WESF operations and maintenance personnel possess extensive facility-specific experience that contributes to the safe operation of the facilities.</p>	<p>The actions taken to date to stabilize the B Plant canyon exhaust high efficiency particulate air filters do not address the present hazards, and the physical condition and performance of the filters are not well characterized.</p> <p>Cognizant engineers are inexperienced and inadequately trained for their assigned responsibilities.</p>
Industrial Safety/Hygiene	
<p>WHC Safety Councils are active, innovative, and well attended by workers and management.</p> <p>RL Facility Representatives at WHC facilities are knowledgeable of industrial safety and hygiene fundamentals and routinely incorporate these topics into facility surveillance.</p> <p>Facility walkdowns by contractors are performed regularly and provide an effective tool to focus on industrial safety and hygiene issues.</p> <p>Contractor ES&H organizations are collaborating with workers and line management to develop consistent and effective industrial safety and hygiene programs.</p> <p>Contractors are transitioning to field-focused ES&H support functions.</p>	<p>Safety and health deficiencies identified during routine surveillance are not formally tracked, trended, or prioritized, and corrective actions, when initiated, are not systematically followed up.</p> <p>Some individuals responsible for requesting health and safety reviews of work packages are inadequately trained.</p>
Radiation Protection	
<p>The contamination control improvement project has been effective in reducing outdoor contamination areas.</p> <p>Integration of radiological engineering functions at PNNL has resulted in notable improvements in radiological work procedures.</p>	<p>RL has not developed and implemented an effective process to evaluate contractor radiological control performance.</p> <p>RL is not providing needed radiological control program direction.</p> <p>Fundamental weaknesses exist in contractor radiological work planning and procedural compliance.</p>

Table 3. Summary of Implementing Programs (Page 2 of 2)

Positive Attributes	Weaknesses and Potential Concerns
Quality Assurance	
<p>Contractor management responsible for procurement cards (P-Cards) has been vigorous in the preparation and administration of training programs, monitoring usage, and enforcing accountability.</p> <p>Among RL and contractor organizations surveyed, personnel qualifications were uniformly high and well documented.</p> <p>Both RL and contractors have initiated actions to deploy matrix ES&H staff to line management in the field.</p>	<p>There is no DOE Headquarters advocate with the responsibility to coordinate and integrate, across the DOE complex, the various elements of the suspect/counterfeit parts program.</p> <p>By cancelling RL Implementing Directive 1000.1, RL has created a policy vacuum in which no reliable, sitewide system of prioritizing deficiencies is in place.</p> <p>Several RL and contractor deficiency tracking databases, which potentially contain key indicators of performance, were incomplete or poorly maintained.</p>
Construction Safety	
<p>Construction managers and safety professionals demonstrate strong safety knowledge, skills, and abilities.</p> <p>Sound construction safety programs are being implemented by KEH and BHL.</p>	<p>Responsibilities and authorities for some RL project managers are not well defined, understood, or implemented.</p> <p>Communication of OSHA non-compliance information from DOE and WHC inspections is ineffective.</p>
Occupational Health	
<p>RL senior management has identified worker health as a core element of its Hanford Site Strategic Plan.</p> <p>Contractor management recognizes the need for effective policies to ensure effective worker health protection.</p> <p>HEHF supports and encourages professional development to maintain competency in occupational health.</p>	<p>The overall occupational health program lacks effective management direction by RL ES&H.</p> <p>Although RL ES&H is aware of its responsibility to develop, implement, and validate the occupational health program effectiveness, little has been done.</p>
Conduct of Operations	
<p>Qualified Facility Representatives and RL conduct of operations assessments are effective in monitoring activities and positively affecting safety culture.</p> <p>WHC established a conduct of operations excellence team established to monitor and foster improvement in performance.</p>	<p>Procedure compliance is inadequate.</p> <p>Deficiencies were noted in upgraded procedures.</p> <p>Some PNNL personnel do not exhibit understanding or acceptance of conduct of operations principles.</p> <p>Facility Representatives are understaffed for PNNL facilities.</p>
Criticality Safety	
<p>Contractor criticality safety engineers are competent and provide high quality safety evaluation reports.</p> <p>Competent contractor criticality safety representatives provide effective interface with operations.</p>	<p>RL policies and procedures implementing DOE Order 5480.24 are still in draft form.</p>
Waste Management	
<p>The low level radioactive waste management system minimizes potential for improperly characterized waste.</p> <p>Waste operations organizations assure effective management of hazardous and low-level solid waste.</p>	<p>RL does not optimize integration of waste management planning.</p> <p>S/RIDs do not capture some applicable requirements.</p> <p>Transition facilities with interim status treatment storage and disposal facilities are not fully implementing requirements.</p>

safety, quality assurance, and industrial safety and hygiene, were generally effective, although some deficiencies were identified in each of these programs. However, improvement is needed in other programs, including radiological protection, conduct of operations, occupational health, essential systems, and process safety.

Assessment Programs. The Facility Representative program, which addresses ES&H as well as other operations, and the activities of the RL ES&H Performance Assessment Division are the primary means for assessing contractor performance in ES&H. Although effective at most facilities, the Facility Representative program suffers from insufficient numbers of qualified personnel. At PNNL, Facility Representatives are not spending enough time in the facilities to accomplish their oversight function effectively.

In addition, the Oversight team identified weaknesses in a number of areas related to performance assessment. Other than the Facility Representative program, RL and contractor management monitoring and assessment of field activities were found to be often inconsistent, infrequent, and inadequately focused on observation of work performance. RL oversight activities and contractor self-assessment processes were also determined to be lacking in scope, formality, and substance. Failure to establish and implement a continuing and effective comprehensive assessment program increases the probability that hazardous conditions will persist without detection or be repeated.

Activities related to ES&H at Hanford are subject to numerous assessments conducted by the DNFSB and other external organizations, as well as those conducted by RL and its contractors. As a result of these reviews, many adverse conditions, programmatic issues, and recommendations for improvement have been identified. However, in many cases, those findings have not been effectively managed to ensure that adverse conditions are consistently and appropriately categorized, prioritized, evaluated for extent of condition and root cause, tracked to timely and proper closure, evaluated for trends and the presence of generic issues, or used as an effective management tool to evaluate performance.

In many cases, internally identified issues have not received the same level of management attention and priority as those identified by external organizations, even though the actual risks may be greater. This can be frustrating for site personnel and a roadblock to effective self-assessment efforts. Without an effective prioritization system, management also has a tendency to overreact to externally identified issues, diverting resources from activities or issues that have a greater effect on safety.

The effectiveness of the Facility Representative program is impacted by shortages in qualified personnel.

Assessment programs are not consistently effective.

Identified deficiencies have not been adequately evaluated.

In summary, RL and its contractors have made progress in reducing hazards, and some elements of a comprehensive program are in place. However, deficiencies were identified in all four of the relevant criteria. Further improvement is needed to assure that requirements are appropriately identified and executed and that the effectiveness of execution is monitored and verified. The deficiencies in sitewide operational discipline, effective work planning, and individual accountability are major contributors to continuing performance problems in some programs, such as radiological protection. Weaknesses in assessment, issue tracking, and corrective action programs allow deficiencies to persist and recur. To address these issues, RL and its contractors have initiated actions to improve individual accountability and acceptance of rigorous conduct of operations, as discussed under Guiding Principle #1. In addition, RL and its contractors need to resolve outstanding issues with the transition to new orders, S/RIDs, and standards based management; continue efforts to upgrade the authorization basis and hazard analyses while focusing more on the related OSR and USQ processes; improve issue management and corrective action systems; and develop a comprehensive assessment program that provides for both self-assessments and independent reviews of performance. RL and its contractors have recognized many of these issues and are taking steps to address them. However, further improvement and additional attention are needed to achieve effective performance.

Guiding Principle #3 - Competence is commensurate with responsibilities.

The hazards present at Hanford are significant, and assuring health and safety requires a broad set of core competencies beyond traditional ES&H disciplines. Such core competencies have already been identified by RL, including facility design; handling, storage, and disposal of special nuclear materials; facility stabilization; maintenance and cleanup of complex nuclear facilities; conduct of operations; environmental modeling; and risk assessment. An appropriate level of proficiency in these core competencies requires senior-level expertise in scientific and engineering disciplines relevant to the current operations and facilities at Hanford. In addition, management and systems engineering expertise are required to apply these competencies in a multidisciplinary, multi-organizational environment, and to provide leadership and guidance to contractors.

RL recognizes that the competence of the Hanford Site workforce, including RL and contractor managers and technical staff, needs to be improved. RL has brought in a number of new senior managers in key positions to help provide leadership, and has requested addition excepted-service positions to further build capabilities.

Of the four criteria under this principle (staffing and qualifications, technical competence, worker participation, and training), RL and its contractors have developed effective training programs and have been successful in increasing worker participation and empowerment.

At Hanford, workers are increasingly participating in and contributing to a safer and healthier workplace, and their knowledge of hazards is

Improvement is needed to assure that requirements are appropriately identified and executed and that the effectiveness of execution is monitored and verified.

Worker involvement in safety management has increased.

beginning to be integrated into job hazard analyses and work planning. Such activities as accident prevention councils and safety committees, worker involvement in job planning and hazard analysis, stop-work authority, DOE's voluntary protection program (VPP), safety award and recognition programs, and employee concerns programs are mutually reinforcing initiatives that enhance worker involvement. Together, these initiatives provide workers with an increased sense of participation and responsibility for their own, their coworkers', and the public's safety.

Stop-work authority is clearly and consistently articulated across the complex and has recently been emphasized through a joint policy signed by the RL manager and by the presidents of the six contractors at Hanford. Workers indicated a willingness to suspend operations as appropriate in order to resolve a safety question or concern, and exhibit the technical knowledge to recognize workplace hazards. Through endeavors such as behavior-based safety training (taken by over 12,000 employees, most of the Hanford Site workforce), workers are trained to recognize potentially unsafe work practices. Generally, workers felt that their management was reasonable and would support stop-work actions. This belief, however, is not unanimous, and there were indications of continuing worker concern over potential management retaliation for raising safety issues. Although some residual concerns remain, it is clear that RL and its contractors have improved relations with the unions and increased worker participation and empowerment.

The RL training and qualification program is well documented, generally meets the DOE order requirements, and is effective in identifying, locating, and procuring training for Federal employees. The RL Office of Training has a competent staff and now reports to the RL Operations Office Manager, thus ensuring that prompt management attention can be provided to address training issues in RL and contractor organizations.

A new approach to training workers in hazardous waste operations and emergency response has been developed at the Hazardous Materials Management and Emergency Response (HAMMER) Training and Education Center. This DOE facility provides state-of-the-art, hands-on hazardous material training in a cost-effective manner. HAMMER is presently funded by Congress and provides training in hazardous waste operations and emergency response to Hanford Site workers. A Board of Directors consisting of DOE, Hanford Site organizations, Federal and state agencies, labor unions, and private industry guides and manages the activities at HAMMER. HAMMER is a notable example of utilizing existing training expertise combined with hands-on training to promote worker health and safety. This facility is intended to be a demonstration model for training throughout the DOE complex.

The structure of training organizations varies significantly among Hanford contractors, ranging from a simple training coordination model (BHI and KEH) to a fairly complex central and facility-specific model (WHC and PNNL). WHC conducts a significant portion of the training provided at Hanford and is the most mature training organization. WHC's approach to training is performance-based and is developed using the "systematic

Workers are generally willing to stop work if necessary to address safety concerns.

The Operations Office's training program is well documented and meets Departmental requirements.

Most contractor training programs are of good quality.

approach to training" model. The quality of training is good and has a number of positive attributes, such as training committees and advisory boards, WHC training implementation matrixes, extensive use of mockups and simulators, a sitewide training standards manual, and arrangements with local universities for specialized and advanced training. Strengthened line management involvement is needed in assuring that employee qualifications are maintained and in assessing the content of training; the effectiveness of facility-specific training; and the performance, skills, and experience of instructors.

With respect to the other two criteria (staffing and qualifications and technical competence), performance is mixed. There are a number of positive attributes and promising initiatives, but further improvement is needed in both RL and its contractors.

RL Staffing, Qualification, and Technical Competence. Overall, the number of RL staff (within Assistant Manager offices and the ES&H Division) is adequate. Qualifications vary significantly among individual managers and staff members. On balance, however, the qualifications of the workforce need to be strengthened. Skill mix problems and skill shortages exist in such areas as radiation protection, occupational safety and health, and criticality safety. Moreover, expertise in such areas as systems engineering and management, as well as facility-specific experience and knowledge, is not strong and requires further improvement. RL management recognizes these deficiencies, and corrective actions, including excepted-service hiring, are being pursued.

The current degree of technical competence of upper-level RL managers is mixed. Several of these managers exhibit excellent technical competence and the ability to focus on important issues. However, such competence and focus are not evident in ES&H areas throughout the RL organization. A number of managers and their staff are preoccupied with routine and administrative duties, and are affected by instabilities resulting from reorganizations and turnover. Some of these individuals have not yet acquired appropriate technical qualifications, and others have not been in their current positions long enough to understand all dimensions of their duties. Additionally, the matrixing of ES&H personnel has not been effective in assuring that the personnel with needed skills and experience are used where they are most needed. Further, RL lacks sufficient personnel with competencies in facility design; handling, storage, and disposal of special nuclear materials; facility stabilization; maintenance and cleanup of complex nuclear facilities; environmental modeling; risk assessment; and management and systems engineering. These deficiencies impede RL's ability to effectively manage contractor ES&H performance, including the review and approval of contractor submittals, the analysis of complex safety issues and events, and oversight of field activities.

The competence of Facility Representatives who have already been qualified is appropriate; however, a number of factors, such as insufficient tenure at a given facility and inadequate resources for mentoring trainees, decrease the effectiveness of this program. Implementation of the response to DNFSB Recommendation 93-3 (i.e., technical qualification programs

The Operations Office's staffing levels are adequate, but worker qualifications need to be strengthened.

The technical competence of the Operations Offices workforce requires improvement.

The technical qualification program and the Facility Representative program are on track, but require continuing attention.

for RL staff) is administratively on solid ground. However, out of 287 staff participating in this program, approximately 70 percent have selected management and environmental focus as their primary functional qualification standards, with concurrence by their managers. Underrepresentation of traditional ES&H, engineering, and scientific disciplines, along with managers' failure to seek assistance from knowledgeable experts in the approval process, raises concerns about the balance and effectiveness of the overall program.

Contractor Staffing, Qualification, and Technical Competence.

Among the Hanford contractors, ES&H staffing levels have not been reduced significantly during the last several years and remain within an appropriate range. The overall qualification picture, however, requires improvement. Localized skill mix problems, inadequate or lacking qualifications, and skill shortages exist. Systemic weaknesses, such as inadequate long-range and strategic staffing plans, as well as a lack of clearly defined career advancement paths, complicate acquisition and retention of high quality staff. PNNL ES&H and WHC radiological control organizations have recently moved to upgrade the qualifications of their workforces. Staffing improvements are apparent, but considerable progress is required to correct systemic weaknesses, such as those related to indoctrination of PNNL researchers in the importance of conduct of operations, and the technical knowledge and supervisory skills of first-level managers and technicians.

Qualification requirements for the workers who belong to unions are well formulated, and in general craftspersons are well qualified in their trades. The responsibility for defining and documenting position-specific/facility-specific qualification requirements for technical staff is assigned to the managers in all contractor organizations. A systematic process for tracking the performance of individual managers charged with this responsibility does not currently exist.

Contractor senior managers have a good understanding of the competence and qualification issues within their organizations, and exhibit an appropriate level of competence. Technical staff and engineers have generally adequate educational background and technical knowledge for their job assignments. Organizational and staff competence for site operations is adequate. Many site operations and support personnel take job qualification training as a basis for developing and maintaining technical competence. On the negative side, localized weaknesses were observed in capabilities to perform root cause analyses, USQ screening, and quality assurance. Instances where job-specific training programs were not in place were also observed, and some duties were assigned to personnel not appropriately trained to make decisions on safety-related matters. For example, personnel responsible for designating the need for industrial hygiene or industrial safety reviews on work packages were inadequately trained and qualified in these disciplines.

A comprehensive approach for specifying and tracking competencies of technical staff does not exist within the Hanford contractor organizations. Individual managers use their judgment and experience to define and track

Contractors' staffing levels for environment, safety, and health are appropriate, but qualifications and skill shortages exist.

Qualification requirements are well defined for unionized workers.

Contractor personnel generally demonstrate competence.

The processes for defining and tracking competencies of technical staff are not well defined.

the competence of their employees. The process is not always well executed. Site contractors need to establish a comprehensive, credible, and systematic process to develop, maintain, and reward technical competence within their workforces.

In summary, additional attention is needed to assure that Hanford Site personnel have competence commensurate with their responsibilities, although RL and its contractors have made progress and have a number of effective programs in place (e.g., increased worker participation and effective training programs). There are sufficient numbers of ES&H staff at Hanford, but workforce qualifications and competencies need to be strengthened. The current emphasis on downsizing in RL and its contractors is providing both an opportunity and a challenge to this goal. Through excepted service and other hiring channels, RL has the opportunity to bring in managers and staff with external industry experience and knowledge. Hanford contractors are motivated to "flatten" their organizations and place managers in new roles where their experience and competence can contribute the most. The technical qualification program and the Facility Representative program provide excellent opportunities for improving the competence of the RL workforce. However, downsizing can contribute to even greater skill mix and competency issues. Unless the process is aggressively and effectively managed, it can result in loss of experience and corporate memory for facility hazards, operations, and configuration. Additionally, downsizing and re-engineering significantly increase the span of control of RL and contractor managers, requiring an even greater need for competency and experience for the remaining managers.

Progress has been made, but additional attention is needed to improve competence.

Overall Safety Management Program

Over the last year, RL and its contractors have implemented a number of significant initiatives to expedite the reduction of site hazards and improve the level of ES&H performance. RL and its contractors have organized the major site activities into distinct projects, brought in new managers to strengthen the leadership of these projects, and made significant progress in cleanup and deactivation of facilities. Strategies have also been identified for reducing hazards, recovering and safely storing spent fuel, and transferring and stabilizing tank wastes. Hanford management has also significantly increased stakeholder involvement in establishing site cleanup priorities and schedules.

However, many of the initiatives designed to upgrade ES&H performance are in the early stages of implementation, and at the time of this evaluation had met with only limited success. New programs within WHC, such as procedure quality and adherence, enhanced work planning, independent assessment, and management re-engineering, show promise, but demonstrate only limited success to date. PNNL initiatives such as the operations improvement program, standards based management, and critical outcomes also have excellent potential but are in the very early stages of implementation.

These important improvement initiatives and staffing changes are beginning to have notable impacts on performance, but once again, only within specific facilities or organizations rather than sitewide. Unnecessary events and accidents that continue to occur, and interviews and observations associated with this evaluation, indicate that the organizational culture is not sufficiently oriented to safety and does not embrace such concepts as effective work planning, rigorous conduct of operations, and strict procedural compliance.

The lack of sitewide operational discipline, effective work planning, and individual accountability is a major contributor to continuing performance problems in programs such as radiological protection. These weaknesses are exacerbated by the current instabilities (e.g., downsizing and the pending transition to a managing and integrating contractor) being experienced at the Hanford Site; these instabilities reduce the morale of managers and staff, and contribute to distractions and decreased attention to detail. When combined with a workforce that has not completely accepted the concept of disciplined operations, these instabilities could lead to even more frequent or serious errors, events, and accidents.

The Office of Oversight recognizes that RL and its contractors have self-identified many of the management deficiencies identified during this Oversight evaluation, and that many of the recent Hanford initiatives have focused on correcting weaknesses identified by RL or external groups. Oversight recognizes that self-identification of deficiencies and the ongoing initiatives to correct them are critical aspects of a safety management program. Accordingly, Oversight considered RL and contractor efforts to correct identified deficiencies when evaluating the guiding principles and the overall safety management program. However,

The Operations Office and its contractors have implemented a number of significant initiatives to reduce site hazards.

Many of the initiatives are in the early stages of implementation, and at the time of this evaluation had met with only limited, and isolated, success.

The organizational culture is not sufficiently oriented to safety, effective work planning, and rigorous conduct of operations.

Deficiencies must be addressed to avoid additional events and accidents.

Progress on self-identified issues has been sporadic.

recognition of self-identification must be tempered by the fact that many of these issues are longstanding and have not been corrected on a timely and sustained basis, and that many initiatives are in the early stages of implementation.

4.0 CONCLUSIONS AND RATINGS

The ratings for the three principles and overall safety management program are shown in Figure 7, which also includes the ratings for the individual criteria under each principle, as discussed in Appendix A. The most significant evaluation findings, both positive and negative, are summarized in Table 4.

RL and its contractors have made notable progress in some areas, such as increasing worker and stakeholder involvement. However, the overall Hanford Site safety management program requires improvement. Further, as shown in Figure 7, improvement is needed in all three guiding principles. Results for Principle No. 1 are judged to be on the border of effective performance because of the recent improvements; however, this progress needs to be sustained.

As the ratings indicate, most elements of the Hanford Site safety management program require improvement, but no single element stood out as being seriously deficient. Positive factors include contractor line management's effectively establishing and communicating policies and goals, RL and contractors' establishing effective training programs, and worker participation and empowerment's notable increase. In addition, RL and contractors have self-identified deficiencies. However, much remains to be accomplished. The RL and contractor initiatives to upgrade ES&H performance are potentially effective, but most of the initiatives are in the early stages of implementation and their success has not yet been demonstrated.

Improvements are needed in most of the individual criteria and implementing programs to assure that an effective safety management program is established and maintained. To effectively address the implementing programs and specific problems identified during this Oversight evaluation, however, RL and contractor management should focus on three general categories of improvement that will provide a foundation for other needed improvements:

- RL needs to be more involved in the management and oversight of ES&H performance. This includes defining applicable requirements, policies, and priorities; clarifying roles and responsibilities; responding to contractor submittals and safety issues; and, perhaps most importantly, directly monitoring ES&H performance.

The overall Hanford Site safety management program requires improvement.

Most elements of the Hanford Site safety management program require improvement.

Operations Office and contractor management should focus on three general categories of improvement that will provide a foundation for other needed improvements.

Figure 7



Table 4. Overview of Evaluation Results

Positive Attributes	Opportunities for Improvement
Principle #1 - Line managers are responsible and accountable for safety.	
<p>Strong contractor management commitment to ES&H</p> <p>Clear Hanford Site ES&H policy by contractors</p> <p>Cooperative relationship with stakeholders</p> <p>Contractor roles, responsibilities, and authorities clearly defined</p> <p>Effective resource budgeting</p> <p>Transition toward greater accountability for ES&H</p>	<p>RL commitment to ES&H; involvement by line managers</p> <p>Explicit RL ES&H policy</p> <p>Formal delineation of individual roles, responsibilities, and authorities for RL personnel</p> <p>Effective measures to ensure and enforce individual accountability</p>
Principle #2 - Comprehensive requirements exist, are appropriate, and are executed.	
<p>External requirements management system</p> <p>Major upgrades to procedures</p> <p>Facility Representative program generally effective</p> <p>Initiatives and actions related to hazards identification and mitigation</p>	<p>Specification of applicable DOE requirements from Headquarters to RL to the contractors</p> <p>Current, accurate authorization bases and their implementation</p> <p>Requirements management processes</p> <p>Recurring issues with procedure compliance</p> <p>Corrective action tracking and trending programs</p> <p>Management monitoring and verification of activities and conditions in the field</p> <p>Management involvement in ES&H activities</p>
Principle #3 - Competence is commensurate with responsibilities.	
<p>Worker involvement in safety</p> <p>Performance-based training program</p>	<p>Localized skill mix issues (e.g., radiological protection and systems engineering)</p> <p>Systems engineering and management skills</p> <p>Focus on improving competence</p>
Overall Safety Management Program	
<p>Recent safety management initiatives (projectizing, re-engineering, operations improvement program)</p> <p>Stakeholder and worker involvement</p>	<p>RL direction and assessment of contractors</p> <p>Near-term authorization basis deficiencies</p> <p>Procedure quality and adherence</p> <p>Radiological protection, especially work planning and control</p> <p>RL and contractor self-assessment</p>

- Both DOE and its contractors need to be more aggressive in changing the organizational culture and achieving consistent accountability for ES&H performance at every level of management, supervision, and staff. This includes increased management presence in the field, coaching and correcting performance, setting a positive example, demanding adherence to procedures and safety policies, and ensuring effective hazards analysis, work planning, and control.
- Improved self-assessment capabilities are needed to facilitate early self-identification of problems, achieve continuous improvement, and reduce the current excessive reliance on external inspections and findings.

Such enhancements are fundamental to achieving the needed improvements in implementing programs and operations at the facility level.

APPENDIX A

SAFETY MANAGEMENT CRITERIA EVALUATIONS

INTRODUCTION

The summary analysis of the evaluation results in the main report is organized around the three applicable guiding principles. It includes ratings for each of the three principles and associated criteria. This appendix presents more detailed results for each of the individual criteria. It is intended to present the supporting evidence that was used to evaluate the criteria individually and collectively as they roll up into the guiding principles and ultimately to the overall rating. The evaluation of the criteria draws on data from both the implementing program and the project/facility reviews. As discussed in Section 2, the evaluation is a deliberative process rather than a numerical scoring exercise.

GUIDING PRINCIPLE #1: Line managers are responsible and accountable for safety.

Criteria 1-1: Clear Policy and Goals

U.S. Department of Energy (DOE) Richland Operations Office (RL) management involvement in establishing and ensuring effective environment, safety, and health (ES&H) policy requires strengthening, but contractor support of safety is pronounced. ES&H goals are developed jointly between RL and contractor management, while RL relies upon Westinghouse Hanford Company (WHC) and Pacific Northwest National Laboratory (PNNL) for developing, communicating, and implementing the Hanford Site ES&H policy. The RL Hanford Strategic Plan focuses on the overall goal of environmental cleanup and the strategies and success indicators associated with accomplishing this objective. Consequently, important ES&H policy elements embedded in the plan are overshadowed by the emphasis on the sitewide cleanup process and related goals. Recognizing this weakness, the RL ES&H organization is contemplating preparation of an overarching document to better delineate and communicate RL's ES&H policy. Currently, the RL ES&H Quality, Safety, and Health Division (QS&HD) is developing a nuclear safety manual that addresses policy, requirements, directives, and guidance.

Evidence of contractor commitment to ES&H includes the WHC President's Accident Prevention Council (PAPC), which is chaired by the WHC president, and has divisional and facility-specific chapters and associated representatives. Numerous goal activities were announced by the Council for 1996, including the following:

- Continued implementation of behavior-based safety
- Development and implementation of a voluntary protection program (VPP)
- Completion of safety training by all managers
- Development and utilization of safety improvement plans
- Enhancement of safety-related communications
- Performance of self-evaluations
- Completion of a hazard recognition training course by representatives from each facility- or division-specific accident prevention council.

Quarterly updates on the progress of these goal activities are provided to the WHC president.

PNNL top management is directly involved with developing ES&H policy and goals. Long-term strategic objectives, referred to as critical outcomes, are clearly defined and include focus areas specifically addressing ES&H, including the following:

- Conduct of operations—meeting or exceeding private sector standards for ES&H performance
- Mission leadership in environmental remediation—improving the effectiveness of environmental remediation.

The PNNL *Operations Improvement Program*, established with RL management involvement, describes eight initiatives—audits and assessments, conduct of operations, ES&H, facilities management, leadership and communication, radiological control, standards development and regulatory analysis, and training—that are the processes for enabling achievement of ES&H and conduct of operations goals. Specific PNNL goals, developed in conjunction with RL management, are contained in PNNL's FY 1996 Critical Outcomes. Division-specific ES&H objectives associated with the critical outcomes are effectively communicated from top to middle levels of management. Communication to lower levels in the organization is in progress.

Generally, clear ES&H policy and related goals have been established and communicated by WHC; PNNL; Bechtel Hanford, Incorporated (BHI); ICF Kaiser (KEH); and the Hanford Environmental Health Foundation (HEHF). WHC sitewide ES&H policy is delineated in its *Company Policies and Charters* document, which is commonly referred to as the WHC Level 1 Manual. The processes used for developing, documenting, and communicating sitewide ES&H policies and goals have been extended to specific facilities. For example, explicit ES&H objectives, such as the 1996 as low as reasonably achievable (ALARA) goals, have been defined by WHC for B Plant, the Waste Storage Encapsulation Facility (WESF), and the Plutonium Finishing Plant (PFP). However, selected ALARA goals at some facilities are not sufficiently aggressive objectives or lack objective measurement criteria. While there is site-wide support for environmental goals, PNNL pollution prevention and waste minimization documentation do not reflect current policy.

The Hanford Site workforce retains a strong "task completion orientation" that is being addressed to ensure that ES&H goals and policies are understood and supported. WHC management is committed to establishing a site culture that is conducive to safety, and is implementing activities to accomplish this objective. Specific initiatives include issuance of a stop work authority jointly with RL and other Hanford contractors, encouraging service on safety councils and safety steering committees, requiring attendance at discipline-specific technical safety meetings (e.g., electrical safety, industrial hygiene), greater employee involvement in developing training programs and procedures, promulgation of a "Workers' Bill of Rights," participation in safety and housekeeping inspections, and preparation and presentation of safety meeting topics. Participation in the DO-RITE (Define, Observe, Record, Intervene, Test, and Evaluate) campaign for one month as an observer is mandatory for all WHC Tank Waste Remediation System (TWRS) employees, according to the *1996 TWRS Training & Procedures Safety Improvement Plan*.

The large number of Hanford Site stakeholders and associated special interests presents a formidable challenge to RL and contractor management. RL management is increasing community involvement and improving coordination with external regulators through the Hanford Advisory Board. RL management is able to effectively convey the basis for complex management decisions by its direct involvement with the Board. For example, stakeholders actively participate in the budget item prioritization process by evaluating risk data sheets and reviewing environmental permit requests and associated grant actions.

Criteria 1-2: Defined Roles and Authorities

Richland Operations Office Personnel

Definition and effective communication of roles and responsibilities for ES&H is in need of improvement at the Hanford Site. Among RL managers and workers, with few exceptions, these roles are either poorly defined or not documented. Contractors, however, are communicating ES&H roles and responsibilities with greater formality and rigor, resulting in better understanding by their respective personnel.

Initiatives by the RL Manager to define and communicate the ES&H responsibilities for the individual technical staff have not been completed. The RL Authorities and Responsibilities Manual (ARM), issued on December 1995, was prepared by the RL ES&H organization with input from other RL organizations to serve the following purposes: 1) is the RL Standards/ Requirements Identification Document (S/RID) in response to Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 90-2; 2) documents the delegation of responsibilities from the Manager to RL organizations; 3) clarified interfaces between RL organizations; 4) delineates RL individuals with authorities for Hanford cost-reimbursement and time and materials contracts; and 5) includes as an appendix delegations of authority from Headquarters. The ARM identifies organizational roles and responsibilities down to the Assistant Managers and Division level, but does not identify the specific roles and responsibilities of the management or technical staff. RL has also prepared the Richland Technical Management Plan, which identifies technical requirements and responsibilities, including ES&H responsibilities.

RL managers when interviewed correctly identified the ARM as the document that defined their ES&H responsibilities. However, technical staff members incorrectly pointed to the ARM as the document that defined their ES&H responsibilities. It appears that RL Division Directors have not yet made staff assignments as the RL Manager had directed in his memorandum of January 29, 1996, regarding the ARM path forward. Timely compliance with this request and follow-up appear to be lacking. Until RL Division Directors have made the individual staff assignments, including the development of associated implementing procedures, the ES&H responsibilities of individual technical staff members remains undefined.

Although the RL Manager issued a December 1995 memorandum that summarized generic ES&H roles and responsibilities for RL personnel, the RL ES&H organization, and contractors, explicit documentation correlating the generic roles and organizational functions with individual responsibilities and assignments does not exist. QS&HD's effectiveness, in particular, is hampered by the absence of current mission and function statements and accurate position descriptions, a situation exacerbated by recent changes in its organizational role. Consequently, RL QS&HD staff are providing (matrix) support to RL line managers in only a few technical disciplines. Much of this support is accomplished by participating in teleconferences and is not performed (on site) at the facility. Furthermore, RL line organization personnel are uncertain of the capabilities and value of ES&H personnel to their operations and proceed to solicit assistance with caution. RL management has preliminarily identified and documented actions to improve QS&HD support of RL line management and their involvement with facility problems.

The absence of clear and open communication and coordination among subordinate divisions within the ES&H organization is truncating oversight activities and hindering effective utilization of RL ES&H personnel. Performance Assessment Division (PAD) oversight is focused primarily on conduct of operations, while criticality safety and occupational safety are not addressed in assessment activities. Although criticality personnel are resident in the ES&H organization, RL management has not developed and implemented a strategy for applying these resources to planned assessments of line operations.

RL's lack of formal assignment of responsibility for ES&H affect many aspects of safety management at the Hanford Site. Lines of responsibility and authority for safety among RL's ES&H and line organizations are not clear, and consequently communication from RL managers to the contractors is inconsistent. With the exception of PMD, subcontractors performing construction work sometimes receive confusing and conflicting information from RL regarding oversight responsibility. These circumstances have been aggravated by a recent reorganization that created a situation where line program managers are assuming the responsibilities of project managers without having received project management training. Additionally, implementation of an integrated sitewide radiological protection program has been impacted by a lack of direction, involvement, and effective communication from RL ES&H and line management to the contractors.

Exceptions to RL's undefined ES&H responsibilities were identified. A draft document prepared by the RL Spent Nuclear Fuels Project Division defines individual responsibilities for ES&H as they pertain to the implementation of a strategy for complying with regulatory requirements. Furthermore, roles, responsibilities, and expectations

for ES&H personnel providing matrix support to the RL Spent Nuclear Fuels Project Division is explicitly addressed in a formal memorandum of understanding (MOU) initiated by the RL line manager.

Functions, assignments, and responsibilities for implementing the RL Facility Representative program are clearly specified in the *Facility Representative Core Program Manual*. This program, along with the activities of the RL ES&H PAD, is the primary means for assessing contractor performance in a variety of areas, including ES&H. RL management, in at least one instance, is using facility representatives to provide technical support as an extension of line staff; this contradicts the purpose of the Facility Representative program.

Hanford Site Contractors

Changed missions, WHC organizational changes, revised DOE orders, workforce downsizing, and the pending transition to a management and integrating contractor at the Hanford Site are creating instabilities and distractions and have the potential to adversely impact ES&H performance. When combined with a workforce that includes personnel that have not completely accepted the increased discipline associated with conduct of operations, the likelihood of serious error, events, and accidents is increased. This situation signals a need for increased, direct management involvement in operations. However, RL senior line managers and, to a much lesser extent, contractor senior line managers have not been adequately responsive or increased their management presence in facilities observing, working, training, and correcting undesirable performance. This lack of management presence aggravates the disruptive forces already in place, and undermines the need to communicate the importance of ES&H relative to production. Other than RL facility representatives, RL line management has not aggressively engaged in the management and oversight of ES&H performance. WHC senior line managers in general, however, are required to spend at least four hours per week in the field. While they are achieving this goal with varying levels of success, chronic performance problems, such as those experienced in the radiological control arena, indicate that commitments to this requirement are either not being fulfilled effectively, or are not being addressed. Additionally, there is a management tendency to treat the symptoms of events and adverse performance instead of determining the management or programmatic weaknesses involved. The time spent by managers in the field, in some cases, lacks effectiveness and structure, and accordingly has not accomplished the desired positive impact on the operating culture.

ES&H roles and responsibilities for Hanford Site contractors are generally well defined, documented, and understood. Contractors have implemented formal mechanisms to document and ensure effective communication of roles and responsibilities for ES&H. In the case of WHC, many of the same formal documents that articulate WHC ES&H policy also delineate ES&H roles and responsibilities for its managers and workers. The series of WHC documents (commonly referred to as Level 1, 2, and 3 Manuals) that focus on providing detailed information on policy, procedures, and facility-specific implementation, respectively, also describe the organizational structure of WHC operations at the Hanford Site facilities and associated individual assignments and responsibilities. Examples include the *Company Policies and Charters* (Level 1), the *Administrative Manual for Environment, Safety, Health, and Quality Assurance* (Level 2), the *Safety Department Administrative Manual* (Level 2), and the *Tank Farm Health and Safety Plan* (Level 3). Complementing this series are additional sitewide, facility-specific, and discipline-specific WHC documents, such as the *Applied Radiological Controls Manual*, the *TWRS Safety Program Planning Document* and the *Health Physics Procedures Manual*. Additionally, individual WHC position descriptions contain roles and responsibilities. While organizational functions at PNNL have been clearly defined, except for information contained in the document entitled, *ES&H in Environmental Technology Division*, delineation of individual roles and responsibilities for ES&H are not clearly communicated or easily accessible. PNNL has recognized these deficiencies and has several ongoing initiatives to correct them.

Consistency and control of subcontractor ES&H performance are aided by using common procedures manuals. For example, WHC Level 2 and Level 3 Manuals are used by KEH while performing work at the TWRS (i.e., Tank Farms). Additionally, WHC and its principal subcontractors—BCS Richland (BCSR), Inc. and KEH-7—

have collectively agreed to and published *Master Safety Rules*, signed by the respective company presidents. This document summarizes the principal safety rules that all employees must comply with, including correcting and reporting unsafe practices and conditions, knowing job hazards, applying established procedures, and using prescribed protective clothing.

The WHC reengineering initiative is impacting manager and worker roles and responsibilities for ES&H, and, accordingly, necessitating the revision of existing relevant documents as facilities and disciplines are addressed by this process. A *Phase I Design Document* has been prepared for the Radiological Control Center of Expertise (COE) that describes its functions and processes. Planning activities are continuing to address the vehicles and mechanics required to clearly define roles, responsibilities, and authorities for ES&H as the reengineering initiative proceeds.

Criteria 1-3: Project and Resource Management

To assist in the budget formulation for FY 1998, RL used the EM guidance that integrates risk information. Risk information is generated via risk data sheets, which capture various activities and evaluate the risk before, during, and after completion of the activity. Activities are then prioritized according to overall risk reduction, regulatory compliance, cost effectiveness/mortgage reduction, and stakeholder concerns. The RDS development process provided RL management with objective information to ensure that all aspects of risk are factored into the budget decision-making process. RDS process training and the use of a risk evaluation consistency team fostered objectivity and completeness in the RDS process. The consistency team was comprised of several RL and EM members, in addition to stakeholders such as the Hanford Advisory Board Representative, Washington State Ecology and EPA representatives, tribal nations, and other public interest groups. Examination of the RDS/budgeting process did not yield any information that required RL to reprogram its FY 96 or FY 97 budgets. Specifically, various RL and contractor managers thought that the RDS process served as a tool with which they could convey the basis of management decisions to the stakeholders. The evaluation did not indicate that current funding levels compromise public, worker, or environmental safety.

Although the RDS approach has enhanced risk-based budgeting, deficiencies in RL and contractor corrective action and issue management systems, discussed in detail under Guiding Principle #2, may adversely impact the ability to effectively utilize, reallocate or adjust budget resources to address significant safety performance problems. RL management has not demonstrated the ability to aggregate and prioritize information from these systems to arrive at a comprehensive solution to ES&H issues. Consequently, the efficient allocation of resources to sitewide safety problems is jeopardized, particularly during significant reductions in resources and funding. The need to effectively prioritize ES&H issues and corrective actions is currently exacerbated by continuing reductions in resources and funding, as well as increasing involvement and pressure from stakeholders and external oversight organizations

Work Hazards Analysis

Work hazards identification is being improved by the adoption of work planning approaches that include review by various safety disciplines (radiation protection, industrial safety, industrial hygiene) prior to initiation of the work. Included in this approach is the growing use of mockups in the Tank Farms, K-Basins, B Plant/ WESF, and PFP, which improves knowledge of the hazards associated with the tasks and effectively trains the workers to work under simulated conditions, plan for contingencies, and improve ALARA performance. Effective work planning, however, varies among the facilities examined.

Areas of strength include:

- Integration of radiological engineering functions at PNNL, which has resulted in notable improvements in radiological work procedures

- Tank Farms use of a computerized job hazard analysis, which enables a user to determine the skill mix required to plan and execute the job
- K Basins work planning which entails job hazards analysis of all work packages and mockups.

Areas of weakness include:

- Individuals responsible for preparing work planning documents (maintenance planners, cognizant engineers, etc.) do not have sufficient "awareness" training in those safety disciplines for which they must recognize potential safety issues (e.g., industrial hygiene, industrial safety, nuclear safety, and fire protection) and determine if further safety and health reviews are necessary.
- Fundamental weaknesses in WHC radiological work planning and procedural compliance, which have contributed to recent events, including a higher than planned personnel exposure, a personal contamination event, and two instances of improperly controlled high-radiation areas.

The enhanced work planning approach to work planning and execution inherent in the WHC reengineering initiative is a promising vehicle for improving work planning and increasing worker recognition of ES&H hazards associated with Hanford Site operations. The decreased levels of management and increased levels of flexibility associated with this approach, however, will require close monitoring in the early stages of implementation.

Criteria 1-4: Line Management Accountability for Performance

The effectiveness of management systems for ensuring management and worker accountability for ES&H performance varies across the site. ES&H roles and responsibilities and accountabilities, while well defined for contractor management and workers through WHC Level 1, 2, and 3 Manuals, the BHI Work Process Model, and the PNNL ES&H in ETD, are lacking for RL. The facility ownership and responsibility exhibited by the contractor is less pronounced in the RL organization. Accountability in RL is hampered by the lack of position descriptions and individual development plans tied to the goals of the organization.

RL Individual Accountability for ES&H Performance

Formal mechanisms for relating individual performance to ES&H goals are not evident for RL managers. Furthermore, RL managers exhibited uncertainty in defining the systems used to address individual accountability for ES&H performance. Accountability for ES&H goals was not directly reflected in individual performance evaluations.

RL employs the 360-degree Performance Evaluation Process to evaluate manager and staff performance. Line managers and staff selected to provide input to a performance review are chosen by the individual being evaluated and approved by the individual's manager. Managers typically do not seek additional evaluators; and, therefore, the process can be manipulated by excluding responses from managers and fellow staff who might provide an unfavorable review. Consequently, the system is ineffective as a tool for achieving satisfactory ES&H performance and instilling a positive safety culture.

The QS&HD recently initiated a program by which S&H personnel accept matrix assignments with the line organizations. These temporary or matrix reassignments, though encouraged by the line, have been completed without corresponding changes in position descriptions, individual development plans, or performance evaluation criteria. Functional reporting, responsibilities, and evaluation criteria for these technical support personnel have

yet to be defined. Lacking such foundation documents, performance evaluations have been subjective and lack the performance metrics needed to provide meaningful feedback to the individual.

In recent months, specific actions have been undertaken by certain RL assistant managers to define individual accountabilities, enhance RL/contractor relationships, and improve communications. For example, DOE AMER reengineered the N-Area Deactivation project team structure and co-located them at the worksite with the BHI N-Area Deactivation team. These actions categorically defined specific accountabilities, identified single points of contact for project activities, and improved communications dramatically between RL and BHI. In the 300 Area, RL-AMT redefined laboratory goals, and subsequent accountabilities and personal ownership of those goals, through the issuance of the AMT Strategic Plan. The strategic plan was subsequently delineated in the Laboratory Management Division-Facilities Operations Team 1996 Program Plan, which outlines the framework for coordinating and conducting the division activities for the year.

Contractor Organizational Accountability for ES&H Performance

The RL award fee process has had mixed results in driving contractor performance in accordance with established ES&H goals. Past performance evaluation plans emphasized safety and health through a weighting factor tied to ES&H performance. Though safety and health represented the majority of the fee percentage (51 percent), criteria used in the determination process were very subjective. Substandard ES&H performance did not consistently result in visible and meaningful consequences in terms of contractor award fee determination.

In late 1995, the weighting factors for the award fee determination were modified to eliminate specific percentages related to ES&H performance, while placing 80 percent of the evaluation on project-specific tasks. The adoption of a new evaluation process has reduced the subjectivity prevalent in past fee assessments.

While a portion of past subjectivity has been removed from the award fee process, a majority of the FY1996 performance based incentives (PBIs) place heavy focus on production goals, e.g., removal of contaminated soil. RL guidance used to develop the new PBI-based award fee process was informal and, as several RL managers indicated, PBIs were set at the expense of and with little regard for the associated safety concerns. Additionally, RL line managers expressed a concern that, with such a mission/production focus, employee ES&H concerns may not be raised and addressed by line management.

For 1996, RL and WHC jointly increased the number of PBIs (e.g. milestones) almost threefold to 95. PBIs now account for about 60 percent of award fee available, of which approximately 15 percent is ES&H performance related. While this approach places less emphasis on ES&H performance, it places additional emphasis on the regular collection of data to objectively evaluate ES&H performance.

Similarly, the BHI environmental restoration contract contains performance objective criteria (POC)-based fees that address ES&H items, such as the zero accident goal for all ERC projects. The BHI core ES&H activities account for only 7 percent of the PBFs—not a considerable portion in light of DOE's ES&H goals. An additional 13 percent is allocated for individual environmental restoration project-related ES&H items. POCs, as well as project accomplishments, are reviewed and graded monthly by the BHI QS&H Manager and the AMER safety representatives.

In 1995, PNNL and RL management initiated efforts to improve laboratory operational performance through development and implementation of the Operations Improvement Program (OIP). The OIP codifies their mutual understanding of the long-term, ES&H, conduct of operations, and related goals of the laboratory. An integral part of this innovative approach was the development of milestones to measure success of the laboratory in meeting the needs of the Department. In the 1995 PNNL award fee process, significant credit was awarded for actions taken to improve ES&H and conduct of operations within the laboratories. While PNNL's actions provided a sound foundation for the future, continuing management attention is necessary to communicate and implement OIP goals down through all levels of the organization.

RL-AMT worked closely with PNNL designing the critical outcomes for FY 1996 and the resulting objectives and performance indicators. For ES&H and conduct of operations, approximately 20 to 25 individual short- and long-term performance indicators are defined for 1996 and beyond. Though these critical outcomes and objectives have not been fully aligned with wage personnel goals and objectives, there are indications that, for the first time, there is awareness of PNNL goals at all levels of the organization.

Contractor Individual Accountability for ES&H Performance

Hanford contractor management clearly comprehends the expectation that line personnel, i.e., managers, scientists, and operations supervisors are accountable for safety. However, failures in work planning, procedural noncompliance, and adverse performance resulting in events and accidents clearly indicate that, while these basic premises are understood, implementation of these responsibilities is deficient.

While interviews with WHC managers and supervisors indicate a clear understanding of their accountabilities with respect to worker safety, exceptions were identified where managers and supervisors do not share the WHC culture and commitment to safety. Instances were identified where managers and supervisors were not held accountable for their individual actions or the actions of their workers. In several instances, supervisors overseeing work activities permitted a direct departure from approved procedures and requirements. No immediate action was taken by management to stop the inappropriate work activities, or to offer worker counseling on proper actions to be taken in the future. There were also recent events, including several while the evaluation was in progress, in which managers and workers did not comply with approved procedures and safety policies, and individual accountability was not apparent in the corrective actions taken.

In recent months, several contractors have developed initiatives to address line management accountability for ES&H. The work process model developed by BHI identifies roles, responsibilities, authorities, and accountabilities for individuals involved in ERC activities. Today, every BHI ERC project uses the work process model Gantt charts to identify functional roles and accountabilities for each project team member with regard to work planning, work package development, and work execution phases of a project. Similarly, as part of the PNNL six critical outcomes, development of a management system that clearly defines roles and responsibilities and accountability and authority constitutes a significant component of the directorate "leadership" goal. While indications of increased emphasis of ES&H accountability were identified, exceptions were prevalent at the site:

- The WHC Tank Farm management performance assessment program, which required management facility presence 18 hours per week, was ineffective and was discontinued.
- PFP operations personnel are not specifically held accountable for attaining waste minimization goals.
- During the evaluation, B Plant/WESF Transition Engineering managers could not produce position descriptions or documentation of organizational roles and responsibilities.

Contractors at Hanford use performance appraisals to delineate and emphasize individual accountability for ES&H. At WHC, ES&H is the first item on an individual's performance evaluation form and includes the individual's personal safety record, participation in safety meetings, responsiveness to ES&H issues and concerns, and personal involvement in corrective actions. During 1995, all PFP employees received profit shares due to good safety performance, with additional awards provided to exemplary performers.

Through the work process model, BHI emphasizes project team accountability for ES&H. BHI emphasizes personal accountability through the annual endorsement of project commitment statements by each project manager and the senior management team. These statements are a cornerstone to the combined goal setting process with RL and are posted in each project office. Furthermore, BHI uses a forced ranking system by which all employees are evaluated on five basic criteria, one of which is safety performance. Interviews with project

managers and support staff indicated that poor safety performance effectively excludes personnel from future work with the organization.

At PNNL, the Staff Development Review (SDR) is supported by a commitment statement by the manager that "commits" specific resources or assistance to support the individual in attaining their goals. Support commitment was identified in several SDRs reviewed; however, effective communication of safety goals and expectations, with linkage to individual performance ratings, as found at the PNNL senior management level, is less evident at the facility (operating floor) level. For example, lab monitors' performance reviews were based on the amount of research dollars acquired, publications and patents, and the attainment of R&D milestones. There was little correlation between their ES&H performance as lab monitors and their promotion and performance compensation. This emphasis on laboratory performance, though critical to the long-term success of PNNL, places little value on ES&H lab monitor task-related activities.

Contractor Accountability for Subcontractor Performance

KEH has developed a standard conditions and safety manuals for use on all construction activities. These documents are contractually required to be implemented by their subcontractors. The provisions in these contract documents specifically hold each subcontractor accountable for implementing a project-specific safety program that meets DOE and Occupational Safety and Health Administration (OSHA) requirements. BHI requires each subcontractor to submit a safety and health plan for review which becomes contractually binding upon approval.

Daily monitoring of job-site safety is the responsibility of the KEH and BHI line organizations. Project managers and staff are assisted by safety and health professionals, who ensure OSHA requirements are met and that identified safety and health non-compliances are corrected in a timely manner. For noncompliance issues that are not immediately correctable, stop work provisions are contained in the contract language, as well as the recent sitewide stop work authority policy. Workers indicated no reluctance to exercise their "stop work" authority. Contractually, KEH or BHI are empowered to discipline or discharge a subcontractor for substandard ES&H performance. This was evidenced in the contractor removal action undertaken by KEH during the construction of the Liquid Effluent Treatment Facility.

WHC line management oversight responsibility for the ES&H performance of its construction subcontractors is being performed; however, greater rigor and frequency is warranted. This hinders instilling in subcontractors accountability for ES&H performance. In addition, WHC ES&H oversight of KEH industrial safety and industrial hygiene performance is minimal. Assessments are infrequent, unstructured, and performed principally in response to requests from the KEH WHC managers associated with the K Basins.

GUIDING PRINCIPLE #2: Comprehensive requirements exist, are appropriate, and are implemented.

Criterion 2-1: Requirements Management

External Requirements

The requirements management system for external requirements is effective. The RL Environmental Assurance, Permits and Policy Division (EAP/ESH) is the focal point and resource center for environmental compliance at Hanford. EAP manages the Hanford Environmental Management Program (HEMP) that was developed and is used by WHC for the continued identification of new environmental regulations for the Hanford Site. EAP chairs weekly environmental meetings of all Hanford contractors. Designated subject matter experts in the WHC Environmental Services group review new and revised regulations that are screened from Federal and state registers for applicability to Hanford, distribute information to facility environmental compliance officers, and initiate changes to the Environmental Compliance Manual and implementing procedures when required. The above process is detailed in procedures, actions are formally tracked, and records are retained of screened

requirements and the evaluation results. Although site personnel indicated that there are weaknesses in obtaining sufficient implementation reviews from facilities and delays in issuing implementing procedures, the process appears to be effective, with new and modified information being distributed through a weekly newsletter that provides information to all site contractors. Resource allocations and funding cuts may be jeopardizing the program by causing HEMP to limit its focus to those regulatory drivers that will lead to substantial fines or imprisonment.

A similar process was applied by WHC for external requirements applicable to the safety and health functional area (e.g., OSHA). However, this process, as performed by the WHC Safety Department of the ESQ Division, was much less formal than the process for environmental requirements. Written procedures were not in place for detailing the process or roles and responsibilities, and no records of register screenings or the applicability/impact evaluations were retained.

Internal Requirements

RL does not have a comprehensive process for integrating DOE order requirements for the Hanford site. The lack of integration could result in problems as changes are made in the long-standing DOE order system, mechanisms for requirements identification, and the transition to various requirements systems at the site.

The management of requirements at Hanford has been more effective in identifying new and revised external requirements than for internal DOE requirements. Uncertainty within HQ and between HQ and RL concerning the status of the streamlined order system has left the contractors at the site looking for guidance, leadership, and resolution. In the meantime, they remain contractually bound to the old orders while trying to transition to the new, streamlined system. The confusion surrounding this transition of DOE orders has not impacted the ability of RL and its contractors to comply with existing requirements.

The streamlining of the DOE order system through the order reduction process and the S/RID approach to requirements management has simultaneously brought dramatic change to the long-established and comprehensive DOE requirements system. This change has not been managed well by RL and Headquarters.

DOE Headquarters

- HQ Human Resources provided specific instructions that no contracts should be modified until the crosswalk of old versus new requirements was completed, thereby impacting any progress by RL on implementing revised orders because RL had typically specified applicable DOE order requirements through its contracts.
- A critical component of the transition to the new order system, the crosswalk (a HQ applicability review of requirements in new orders against old orders), has not been formally transmitted to RL.
- The HQ EH office responsible for developing the crosswalk transmitted it to HR, but HR has not made it formally available. However, RL has already transmitted four revised orders to the contractors despite the absence of related contractual modifications. RL has obtained varying degrees of compliance with the new requirements from contractors on the site.
- The DNFSB reviewed the DOE-wide implementation of the new orders and have raised an issue to the Secretary that no contracts be modified until their perspectives on deficiencies have been adequately addressed. Therefore, management of the requirements contained in DOE orders at Hanford continues to be uncertain pending the resolution of issues related to the conflicts and concerns of not only DNFSB but also DOE EH, EM, ER, and HR.

DOE-RL

- Activities in sitewide requirements management have lacked rigor and formality with regard to procedures and documentation.
- With respect to requirements management at Hanford, particularly concerning the interfaces between the multiple contractors on site, in some cases inconsistent sets of requirements between organizations on an individual work activity (e.g., WHC and KEH at the Tank Farms) exist.
- All contractors have requested modifications to their contracts to reflect the new orders, but RL cannot comply until the crosswalk is completed and transmitted by HQ.
- RL has not defined the requirements for an occupational health/medical surveillance program that can be integrated among all contractors and Federal employees at Hanford.

Contractors

- WHC has been in the forefront in the development of Standards/Identification Documents (S/RIDs). WHC has developed and submitted to DOE a company-level and facility-specific S/RIDs as defined in the DOE Implementation Plan. Some S/RIDs contain technical errors and omissions.
- PNNL facilities 324, 325 and 327 were specifically included in the 90-2 Implementation Plan. However, to date PNNL has not prepare S/RIDs for these buildings. PNNL has initiated the standards-based management system (SBMS) as a single requirements management tool to capture all of the requirements of all customers of PNNL.
- KEH has been seeking clarification and approval from WHC of applicable DOE requirements for its activities since mid- 1995 without success.

WHC S/RIDs Process

WHC has developed, and submitted to DOE, a company-level S/RID to focus on those requirements performed by a central WHC function or organization. This S/RID collects only those requirements with which WHC must comply. WHC is developing facility-specific S/RIDs as defined in the DOE Implementation Plan for DNFSB Recommendation 90-2, Revision 5. The Implementation Plan for 90-2 called for the use of the S/RID for nine facilities at Hanford:

- Four of the facility-specific S/RIDs have been completed and approved.
- All of the other WHC S/RIDs have been developed and are in various stages of completion or review and approval.

The evaluation identified a number of concerns related to the development, accuracy, oversight, and utilization of the WHC S/RIDs:

- S/RIDs for WESF and Tank Farms did not have independent validation of source documents and identified requirements, and RL approved the K Basins S/RID without independent validation. RL and WHC incorrectly believe that the DOE-RL S/RID approval is an adequate assessment and that this assessment constitutes an independent validation of the original set of requirements. For some earlier S/RIDs (SWD and K Basin), facility-specific S/RIDs did not identify interfaces between facility requirements and the company S/RID or between functional areas at each facility. In addition, at WESF and PFP specific applicable safety requirements were not captured by the S/RIDs—errors that were not identified during the RL review and approval of the PFP S/RID.

- Procedure QI 2.8, Developing and Maintaining S/RIDs, (from controlled manual WHC-CM-4-2, Quality Assurance) was issued February 15, 1996, after some S/RIDs were developed, Phase 1 evaluations were completed, and after several Phase 2 implementation evaluations were initiated. During the development of some S/RIDs, WHC was working to draft procedures that resulted in the S/RIDs being forwarded to DOE for approval and evaluated for implementation, based on procedures that had not been formally reviewed and approved for accuracy and adequacy. Likewise, PFP and B Plant/WESF did not have procedures to implement QI2.8 or the previously issued draft instructions. Although WHC policies do not require facilities to have specific instructions to implement company wide policies/procedures, facility-specific instructions on development, review, approval, and use as the S/RIDs should serve as the basis for establishing requirements for procedure development and change and for corrective action resolution.
- The Solid Waste Disposal Facility (SWDF) was the first Hanford facility to get an approved S/RID. As part of the SRID process, exemptions from ten Level 1 WHC policy manual requirements were requested and approved. One of the exemption requests, to WHC-CM-1-4, Corrective Action Management Manual, states that this manual "imposes additional requirements beyond those required by the ones addressed in the SWD S/RID." It also states that "SWD is performing actions required by the occurrence reporting and processing system which is adequate and necessary to ensure the safety of the employees, the public, and the environment." WHC-CM-1-4 requirements are in line with the quality improvement processes requirement of DOE 5700.6C and 831.20. The exemption request did not provide sufficient justification and details of the specific requirement(s) involved and does not describe how each was fully addressed by SWD procedures.

Direction and information related to proposed, new, or revised DOE directives pass from RL Procurement Services Division to WHC Contracts Administration to WHC implementing organizations for action. WHC Controlled Manual WHC-CM-1-3 details the WHC procedure for processing new and revised DOE directives and for commenting on proposed changes. Action items are tracked in the Westinghouse Commitment Tracking System. Most facilities do not have implementing procedures for the WHC sitewide level II procedure.

PNNL Order Compliance

In the past, PNNL has not had a formal, centralized order compliance management system to handle orders, directives, and rules. Orders, directives and rules were managed by subject matter experts assigned to the functional organizations that managed safety and related program areas. New requirements were implemented through changes in manuals issued typically to management and staff. In some cases, DOE imposed compliance based requirements have not been met. For example, even though specifically included in DNFSB-90-2 Recommendation, and committed to by DOE in the Implementation Plan (IP), PNNL has not implemented S/RIDs for Buildings 324, 325, and 327. PNNL has requested funding from DOE for the development of these S/RIDs; however, funding has not been received. PNNL has embarked on a comprehensive system of requirements management called the standards-based management system (SBMS), which is to encompass the requirements of all the customers of the Laboratory into one unified system. The requirements are being integrated through a computer-based software system for real-time access by Laboratory staff. Currently in a pilot program stage of completion, the SBMS concept has significant potential to allow correct and complete identification and applicability of all requirements for any activity in the Laboratory and to increase the requirements knowledge of the staff, thereby improving compliance. However, even under this approach, significantly increased management emphasis on priority to compliance with identified requirements is necessary to assure staff acceptance and implementation. This advanced methodology will not improve performance within the laboratory without increased management emphasis.

WHC Requirements Reengineering

As part of the ongoing WHC reengineering effort a "requirements reengineering" program is being established that adapts the processes for managing requirements to the new, reengineered, decentralized WHC site organization. Requirements reengineering:

- Involves the four functional areas of quality, safety and health, environment, and radiation control.
- Establishes centers of expertise (COE), which are teams of subject matter experts from the central WHC functional organization and from each of the various facilities. These COEs function as a filter and funnel to capture and evaluate new or revised requirements, evaluate changes, ensure development of appropriate implementation documents, and enhance communication and involvement with the work force
- Creates an executive board of senior WHC managers and representatives from DOE, Boeing, KEH, and the bargaining unit, the purpose of which is to provide oversight and consistency to the re-engineering process
- Will develop assessment criteria and standards for assessing compliance with requirements with the newly created Facility Evaluation Board and the COEs.

Criterion 2-2: Hazard Analysis and Authorization Basis.

Hazard Analysis

The DOE and contractors at DOE-owned or leased nuclear facilities are required to identify and evaluate facility hazards, and to define the measures that must be implemented to control those hazards. A system of formal, current hazards analyses and current, approved authorization basis documents is an essential part of a comprehensive safety management program for DOE facilities during all life cycle phases. The authorization basis includes aspects of the facility design basis and operational requirements important to safety upon which DOE relies to authorize operations. Operation within the bounds of the envelope of the authorization basis documents ensures that facilities are constructed, operated, maintained, shut down, and decommissioned safely and in accordance with applicable laws and regulations. The contents and processes for developing, approving, and maintaining these documents are detailed in a series of DOE orders and standards.

Authorization Basis Documents

The lack of current and accurate authorization basis documents for Hanford nuclear facilities that comply with current DOE orders and standards has been an acknowledged, ongoing issue for several years. Numerous external and internal assessments of the authorization basis documents and related programs have been conducted, including close scrutiny by the DNFSB, especially with regard to the Tank Farms. Many factors affect the quality, format, and approval status of the current authorization basis documents for Hanford facilities, including the age of the facilities and major modifications, the time period when existing authorization basis documents were initially prepared, the adequacy of configuration control systems, the status of current and future utilization, and the many corrective action plans for upgrading authorization basis documents. Many SARs and OSRs/TSRs are in the process of preparation or revision. See Table A-1 for the current status of key authorization basis documents for selected

Table A-1. Status of Authorization Basis Documents

Facility	Current AB	Future	OSR	Comments
B Plant	1986 SAR WHC-SD-WM-SAR-013 (not approved by RL) Hazard Identification & Evaluation WHC-SD-WM-SAR-008 (not approved by RL) B Plant Exhaust Filter Outlet Seal Analysis WHC-SD-WM-TI-554 (not approved by RL) 3 PSAR reports that are not in SAR (not approved by RL)	ISB submitted to DOE 3/96	OSRs are in SARs	No SAR upgrade planned
WESF	1985 approved SAR	ISB in progress (9/96 target date) 5480.23 SAR in progress	No OSRs in AB list	ISB has new accident analysis 5/9 OSRs deleted RL approval
PFP	1/95 FSAR 5480.1B	No plans to complete a 5480.23 SAR	OSRs approved 5/94	PFP not in EM field delegation letter; does not met 5480.23 worker safety
K Basins	1984 SAR New SAR approved 11/95; completing training & procedures upgrade	OSRs in effect for 1984 SAR that includes 1995 ECN Revisions; new OSRs approved 1/96 will be implemented with new SAR	New OSR approved by DOE 1/96	Improvements still needed on System Design Descriptions K Basin SAR revisions to include additional operations + worker safety
Tank Farms	Approved ISB 11/94	Revised ISB 3/96 & 9/96 New FSAR 10/96 (5480.23)	Requires revision	SAR task force established for accelerated schedule
PNNL Bldg. 324	1984 SAR Supplement 1985 SAR 1995 SAR & SER Supplement for B Cell Holdup Material	New SAR to (approved by RL 1/96)	In PNL-LIM-324, Operating Limits	
PNNL Bldg. 325	1977 SAR	New SAR to RL for approval 2/96	1991 OSRs New OSRs to RL for approval 2/96	Now preparing Building for downgrade from Hazards Category II to Category III by reducing inventory.

Hanford facilities. The evaluation team did not conduct a comprehensive assessment of the various and complex ongoing authorization basis issues at Hanford, but did evaluate certain elements of the current programs and documentation related to hazard analysis and the authorization basis.

WHC has prepared, and DOE has approved, a single implementation plan (IP) that describes a strategy for compliance with 5480.21, 5480.22, and 5480.23 requirements. However, this plan provides schedules for the interim safety documents and defers incorporating into the IP specific plans for upgrading SARs and developing TSRs until after the issuance of the corresponding rules. Funding for current safety documentation upgrades is provided thorough the reprioritizing of existing work scope.

The team identified some positive initiatives and actions related to hazard identification and mitigation. Comprehensive liability reduction programs are being implemented by WHC that have significantly reduced or stabilized the inventories of hazardous and nuclear materials at B Plant/WESF, PFP, and K Basins. A comprehensive facility hazards analysis, system walkdowns, and a safety and accident analysis process compliant with new DOE standards were used for the B Plant Facility Hazards Analysis. The development of the new K Basins SAR and OSRs demonstrated a thorough understanding of the requirements, the formality and technical rigor in the preparation process, and the significant line organization involvement. However, this process did not adequately address worker health and safety requirements, a deficiency being addressed in the ongoing SAR upgrade effort. Programs for enhanced work planning at several facilities appeared to provide for more focussed attention and worker involvement in hazard identification and control.

Concerns and deficiencies were identified with the hazards analysis and authorization basis processes utilized for WHC facilities, including SAR maintenance and upgrades, OSR/TSRs, and the application of the USQ process. The potential impacts of the conditions resulting from these deficiencies, without mitigative actions, could impact worker health and safety, reduce operability of safety class systems, and create unanalyzed system conditions. See Table A-2 for a summary of

specific deficiencies related to hazards analysis and authorization basis documentation.

As stated earlier, many deficiencies related to the SAR maintenance and upgrades, OSR implementation, and USQ application have been acknowledged for years. However, the corrective actions have been focussed on individual deficiency areas and EM has not directed RL, nor has RL directed WHC, to develop a comprehensive approach to ensure compliance with the authorization basis requirements specified in current DOE directives. The interim safety basis documents prepared by WHC and approved by EM or RL were based on analysis of old SARs that did not include a full spectrum of accidents inclusive of worker safety hazards and risks. For SAR upgrades at PFP and K Basins that had been initiated prior to the release of 5480.22 and .23, but approved only recently, the new requirements have not been met; and DOE approval is anticipated when exemptions to DOE 5480.23 requirements are formally submitted.

Hazard Recognition and Control

In addition to the hazard analyses provided in the authorization basis documents, various other lower level programs also directly provide continuous, real-time identification, evaluation, and elimination or mitigation of hazards. These programs include the VPP, the various accident prevention councils, work planning, and surveillances and oversight activities of safety/ health/radiation protection professionals and line management and supervision.

Although these processes provide essential means to protect the worker, public and environment, the quality, extent of evaluation, and the application of the information generated has not always resulted in an effective program of hazard recognition and control. Examples of deficiencies identified include:

- Individuals are relied on to identify radiological hazards and protective measures as the job is initiated or while in progress, rather than implementing appropriate planning tools. WHC and PNNL RWPs were out of date, incomplete, or unclear. WHC pre-job surveys and planning were not sufficiently utilized.
- Comprehensive baseline hazard assessments prepared for Hanford facilities are primarily poorly organized collections of OSHA discrepancies with no industrial hygiene reviews, no categorization and prioritization of issues, no sampling strategies for workplace hazards, and no exposure monitoring programs. Further, these assessments are not up to date utilized by the health and safety staff or work planners.
- The TWRS Health and Safety Plan (HASP) is used for work planning, but data obtained from field monitoring and sampling are not fed back into the HASP or work planning activities.

No sampling strategy is defined for quantifying hazards or determining exposure and risk.

- Although matrixed WHC health and safety professionals perform routine surveys and surveillances of conditions and work activities, adverse findings are typically not entered into any tracking system and are not trended.

For Buildings 324 and 325, the review and approval of the Implementation Plan for 5480.23 was hampered by the need to clarify the issue of ownership of the nuclear facilities between ER and EM. In the interim, ER decided it could not support a timely review as specified in DOE 5480.23 and advised RL that the IP would not be subject to "automatic approval in 180 days of submittal unless approval action is taken by the CSO." While the ownership issue was never fully resolved (ER and EM share responsibility for common functions such as building maintenance), subsequent EM delegation of authority letters resulted in RL assuming responsibility for approval of 324/325 safety documentation. The authorization bases for Buildings 324 and 325 are nearing the completion of a significant upgrade process that includes replacing both SARs and developing a new set of OSRs. The longer term outlook for authorization bases for these two facilities is promising.

Because of the wide variety of multiple projects that may be in progress at any given time, PNNL used a proposal preparation and preliminary risk assessment process and has instituted a facility use agreement process to ensure both adequate hazard analyses and controls. The "Prep and Risk" process defines hazards associated with proposed work activities. It helps identify requirements and procedures applicable to a proposed project to determine feasibility and define what constraints apply. Work activities that satisfy the requirements addressed in the hazards analysis must then conform to the operational boundaries of the facility. This is accomplished through the Facility Use Agreement, which is used to specify the ES&H requirements to be satisfied by the researchers. This system places considerable emphasis on individual accountability, as does most of the ES&H program at PNNL.

Both KEH and BHI use activity based hazards analyses because this approach is more appropriate for their type of work function. With KEH, only personnel signing the pre-job safety planning sign-off are allowed to work on the job, thereby ensuring involved personnel are familiar with hazards and the specific measures to control or eliminate hazards.

HQ EM and RL have not taken timely action to resolve the facility and hazard classifications of the N-Reactor. When contractual responsibility for the N-Reactor was transferred from WHC to BHI, it was classified as a Category III nuclear facility for its post operational life. When BHI ERC took over the deactivation activities, ERC re-classified the N-Area, including the reactor project, as a non-nuclear "industrial facility, with contamination", because it no longer housed any fuel, control systems, or equipment that would be considered necessary for it to be considered a nuclear facility. However, after more than two years, DOE has not yet formally evaluated or concurred with this reclassification decision. DOE EM and RL do not have a policy or guidance on how to determine the applicability and extent of DOE nuclear orders to deactivation activities for reactors.

Although progress and some improvements have been achieved, much remains to be done to bring the hazard analysis and authorization basis documents at Hanford up to date and in compliance with requirements and DOE expectations. Additional effort is also required to ensure that these essential

programs are properly implemented and maintained. Continued, focussed attention by the management of DOE/HQ, RL, and the Hanford contractors will be required to complete and fully implement an effective process for managing the authorization bases.

Criterion 2-3: Implementation of Requirements

Implementing Safety Programs

The implementation of requirements sitewide and at specific facilities not only must include well documented guidance and direction through formal plans, policies, and procedures, but also the understanding and compliant application of those requirements at the working level. Clearly, many requirements have been and continue to be translated properly into implementing documents and implemented as specified by Hanford personnel.

However, this evaluation as well as other recent internal and external assessments have identified numerous, continuing problems with the implementation of requirements at Hanford.

Implementing Procedures

Many of the findings related to a lack of formality in that procedures did not exist, were inadequate, or were not followed. Overall procedure quality, usage, and a history of continuing events related to procedures and procedure non-compliance indicate that the standards defined in DOE 5480.19, Conduct of Operations, and DOE 5700.6C, Quality Assurance, are not being met. The quality of procedures has been an ongoing identified concern at Hanford for which extensive corrective actions continue to be developed. However, the lack of formality in performing activities related to ES&H as stated in procedures is not an issue that requires significant expenditure of resources to correct; it is a cultural issue that must be corrected by the leadership and direction of site management and support of the unions.

Examples of requirements implementation deficiencies identified by the SME Team include:

- In several observed cases, noncompliance with operating procedures as a means to work around deficient procedures was considered accepted

practice by workers and was witnessed or directed by supervision. Procedure steps were not performed, were performed incorrectly, were not performed in the sequence specified, or steps were performed that were not in the procedure, i.e., valve manipulation. Precaution/warnings in procedures were not followed and were not understood.

- Inadequacies in operating procedures existed such as missing valve and electrical line-up sheets, no emergency procedures for some potential events, failure to address all required evolutions, unclear steps, and technical errors.
- Numerous implementation problems related to radiation protection at several WHC facilities, including inadequate RWPs, work plan document review checklists, critique and trending of post job exposure variances, pre- and post-job ALARA reviews, and redundant or conflicting radiological controls for joint WHC and KEH work activities.
- Failure to follow procedures related to radiation protection, including failure to perform surveillance activities, failure of ALARA planners to review and approve RWPs, working without required RCT coverage, failure to survey laundered protective clothing as required, and inadequate control of the issuance of sealed sources at Tank Farms. A shipping cask at PNNL at Building 324 containing spent nuclear fuel was not locked in accordance with existing procedures. In addition, this cask was not labelled to warn of the high radiation field that would exist if the cask was opened, later estimated to be approximately 25 rem/hour at 30 centimeters. This was determined to be a reportable event. A similar condition had been identified in a January 1996 Radiological Problem Report for which management did not provide a timely response.
- BHI does not perform regular surveillances of rooms within the N-Reactor Building where hazardous materials are stored.
- The overall site occupational health program lacks effective management by RL. Although requirements for health surveillance are defined

for both Federal and contractor workers, their implementation has not been verified effectively.

Other areas of implementation concerns include radiological control activities, the construction safety program, and the occupational health program.

- RL is not providing needed radcon program direction and lacks a systematic process to ensure consistent sitewide implementation of requirements.
- Requirements specified in DOE 5480.9a are not fully contained within the Construction Environment, Safety, and Health (CESH) manual of KEH.
- Specific actions to improve the occupational health/medical surveillance programs identified in the Hanford Strategic Plan (Jan 1995 Strategic Plan Supplement RL-D94-046) have not been completed, effectively updated, and tracked.

Concerns surfaced regarding implementing the authorization bases, including USQ screening and implementation deficiencies, SAR development, maintenance and upgrades and interim safety basis (ISB) development.

An extensive effort has been ongoing to upgrade the quality of procedures sitewide, especially with regard to operating procedures and the linkages to OSRs/TSRs. Much improvement is apparent. The procedures upgrade process at Tank Farms appears to have been very successful, with good validation and use of electronic issue to facilitate access and use of latest versions. However, a recent technical assist evaluations of procedures at each facility identified weaknesses in the quality of procedures and in facility procedure control program elements such as OSR implementation, USQ reviews, validation, bypassed quality hold points, and change control.

Implementation of authorization basis requirements for basis of interim operation (BIO) documents was hampered by the uncertainty associated with ownership (ER vs EM) of the PNNL Buildings 324 and 325. New SARs for Buildings 324 and 325 should be approved by the time this report is completed. The revised OSRs for Buildings 324

and 325 were submitted along with the revised SARs. The USQ process at PNNL is currently functional but is undergoing some enhancements to make it more efficient. These are positive steps towards upgraded authorization basis.

However, fully 30 percent of all compliance-based activities identified at PNNL for ADS funding fall below the RL-approved budget cut-off figure for FY 1996. Since ADS funding is based on a prioritization process that emphasized safety considerations, several compliance activities are not assigned sufficiently high priority to be funded.

One long-standing example of this is that PNNL has not had an effective configuration management (CM) program for the 324 and 325 buildings for at least the past five years.

- A proposed configuration management (CM) program described in PNL-MA-598 has been available since December, 1991. However, a CM program was never fully funded. The lack of a CM program has been acknowledge by PNNL and this Team as a significant contributor to conduct of operations problems.
- While line drawings of electrical and other systems are reportedly available, the labeling of equipment and indicating devices in the buildings is incomplete, the SAR requirements are in flux pending approval by DOE, and facility baselines have not yet been prepared.
- The OIP should bring needed improvements when completed.
- The focus must now be on budgeting control and prioritization of health and safety-directed compliance activities.

An example of concerns with HQ's participation in the requirements management process was the creation of Basis for Interim Operations (BIOs) by PNNL, which were transmitted through RL to HQ ER and EM several years ago. However, these HQ offices never acted to approve or formally comment on these documents. HQ had not resolved the issue of ownership and did not have the resources to review and critique all the BIOs which were submitted from across the complex, and took the position that they would reject BIOs they could not

review rather than let them fall into the 180-day period of non-reply, implied acceptance.

With the ongoing reengineering of WHC functions, the normally structured process for manuals and procedures has been disrupted such that management of some procedures and the transition has been ineffective between facilities. A major revision of the WHC Corrective Action Management Manual, WHC-CM-1-4, in July 1995, consolidated eight procedures and two appendices into one less prescriptive policy document. However:

- Many facilities have not developed processes to implement such WHC sitewide policies, and many still do not have facility implementing procedures for corrective action;
- There was little control or oversight of this transition process and the following deficiencies were identified:
 - Formal training for facility personnel
 - Senior management communication of expectations
 - Follow-up oversight or evaluations to ensure proper understanding and timely implementation at facilities.

Requirements Implementation

Inadequate implementation of requirements continues to be a concern across the Hanford site. Identified deficiencies in procedures confirms previous findings that procedure verification/validation activities are insufficiently rigorous to identify significant technical and structural deficiencies. That these deficiencies were identified by the SME Team also indicates weaknesses in the level of self-assessment and internal oversight. The unacceptable health and safety culture that accepts “working around” procedural requirements or deficiencies must be changed by clear communication and enforcement of conduct of operations requirements and by ensuring that systems for changing and upgrading procedures encourage procedure adherence. Procedure non-compliance based on schedule pressures, manage-

ment judgments, or individual desires is not an acceptable mode of operation.

Figure A-1 shows an example of an event that occurred during the oversight evaluation. It illustrates implementation weaknesses, and factors that contribute to the event.

Criterion 2-4: Performance Evaluation

Assessment

Performance evaluation encompasses the monitoring, reviews, and assessments conducted by contractor independent and internal elements, RL line and independent organizations, and external groups. Performance assessment also includes the system(s) used to capture, document, evaluate, correct, track, and trend, and prevent recurrence of the adverse findings identified during these assessment activities.

An integrated approach to comprehensive monitoring and assessment of ES&H performance has not been institutionalized at the Hanford Site.

Direct participation by management in structured monitoring, assessment and verification of activities and conditions in the field is not consistently effective, too infrequent, poorly documented, and not sufficiently focused on observing and correcting personnel performance.

Performance indicators are not being used effectively sitewide to track, analyze, trend, and improve ES&H performance. However, ICF KH has successfully implemented a monthly performance indicator/trending report that has resulted in increased control over identified deficiencies and has reduced their total number of conditions.

Many factors that now affect the work force at the Hanford Site have a direct impact on the need to increase the frequency and effectiveness of management's presence in the field. These include downsizing of staff across the site, facility shutdowns, the performance of unfamiliar work activities during the transition of facilities from operations to deactivation, increasing work hazards, re-engineering and subsequent destabilization of traditional organizational structures, increasing use of subcontractors, and the loss of staff familiar with systems and facilities on the site.

The team identified weaknesses in a number of areas related to performance assessments, specifically with regard to management monitoring and assessment of field activities, RL oversight, self-assessment, and the management of the adverse conditions identified by the assessment activities that are performed. RL recognition of this situation is contained in a letter, AMW:CAH/96-AMW-001, 13 Feb 96, from Wagoner to Grumbly which notes that, "In the past, we have spent too much time on budget, schedule, process, and format matters rather than checking on actual compliance and implementation of authorization basis requirements."

Activities at Hanford that involve or effect ES&H are subject to numerous and various assessments conducted by internal and external organizations. External assessments are performed by DOE HQ offices, the DNFSB, EH Residents, RL ESH/PAD, and the state of Washington. Internal assessments include independent assessments such as by RL Facility Representative surveillances and performance assessments, RL ESH matrixed professionals

surveillances, RL program assessments, and WHC's Compliance Assurance organization technical assist visits for procedures and conduct of operations, and surveillances by centrally assigned and matrixed WHC ESH and QA personnel. Internal assessments also include self-assessment activities, including a variety of management surveillance programs. Worker involvement programs such as the VPP and Accident Prevention Councils also provided assessments of ES&H conditions and practices.

As part of the WHC reengineering and decentralization process, the sitewide independent assessment function executed by Compliance Assurance through the performance of Integrated Audits and Appraisals is being replaced by annual comprehensive assessments of each facility performed by a newly formed organization called the Facility Evaluation Board, modeled after a similar program in place at Savannah River. The initial evaluation is scheduled for April 1996.

Self-assessment programs have been developed by WHC, KH, ERC, and PNNL and are in varying stages of improvement and implementation. At WHC facilities many self-assessment programs are newly established and not yet fully implemented or out-dated and not being fully complied with. Most facilities have established procedures for routine, scheduled management tours (K Basins, PFP, Tank Farms and B Plant/ WESF), some for biennial assessments of S/RIDs functional areas (PFP), and others for a variety of maintenance, operations and engineering group assessments (PFP, B Plant/WESF).

Based on previously identified system failures and weaknesses, Tank Farms is conducting an aggressive, comprehensive review and overhaul of their assessment and corrective action processes, including a new management oversight program and integrating assessment activities. At K Basins, weekly facility walkthroughs are performed by the WHC IH/IS Manager with the K Basins Director, his deputy, and the facility manager, focussing on health and safety issues selected by the IH/IS Manager; a very effective process for involving management directly in safety and health concerns and the evaluation of corrective actions.

KEH has performed self assessments in 1994 and 1995 that provide a significant scope and input from

all parts of the organization and showed a slight improvement in measured performance. PNNL, with the involvement of two cognizant RL Assistant Managers, has recently instituted an integrated assessment program that relies heavily on Executive Management to perform individual self-assessments of their respective Divisions and Directorates. Using a four-step process of setting-measuring-evaluating performance and then implementing improvements, the process provides a level of detail down to personal objectives for each staff member. Such a comprehensive system can bring significant improvement provided individual accountability and responsibility are maintained while not allowing the required activities to feed the system to be all-consuming of staff members' time.

The team identified significant deficiencies and weaknesses in the assessment of performance at Hanford, especially with regard to RL oversight, formal monitoring of field activities by management, self assessments, and the analysis of performance data such as trending and performance indicators. See Table A-3 for examples of these deficiencies. Strengthened self-assessment capabilities within RL and contractual organizations are essential for continuous improvement, timely self-identification of deficiencies.

Corrective Action Management

Notwithstanding the above weaknesses in conducting assessments, large numbers of adverse conditions and programmatic issues related to ESH and quality have been identified by the various assessment activities that are conducted at Hanford. However, in many cases those findings have not been effectively managed to ensure that adverse conditions are consistently and appropriately captured, prioritized, evaluated for extent of condition and root cause, tracked to timely and proper closure, evaluated for trends and the presence of generic issues, or used as an effective management tool to evaluate performance. One contractor, BHI, has a centralized corrective action tracking and trending program that includes formal implementing procedures. However, RL, WHC, and PNNL corrective action management systems had deficiencies.

- The RL implementing directive that outlined the processing and closure of adverse conditions was

canceled in April 1995; RL has not issued any subsequent comprehensive guidance, either for the contractors or for internal RL activities. Various RL organizations have instructions addressing the processing of findings from their particular assessment activities, but there is no consistent RL-wide, sitewide guidance or direction. Status and closure information is often not provided in a timely manner to keep RL's corrective action tracking system, the Central Information Control System (CICS), from diminishing its value as a tracking or trending tool.

- As part of its ongoing reengineering process, WHC extensively revised its Corrective Action Management Manual, WHC-CM-1-4, in July 1995, condensing eight procedures and two appendices into one less prescriptive policy/-procedure document. Although the expectation was that individual facilities would develop procedures to implement WHC sitewide policies in these areas, many of these elements do not have implementing procedures to date.
- The PNNL corrective action tracking system (CATS) is not being fully implemented as required by PNL-MA-41, Pacific Northwest Laboratory Self Assessment Program. Risk ranking is not well controlled or monitored for accuracy and consistency. The PNNL corrective action program, including the risk ranking process, is scheduled to be reevaluated in June 1996.

Inadequate controls related to risk ranking of adverse conditions have damaged the credibility and usefulness of this process for prioritization and resource management for corrective actions:

- Previously, the RL directive specified that items risk ranking scores greater than 25 required RL verification for closure, with other levels of contractor verification for lesser scores. Current WHC policy does not refer to RL or WHC verification, and allows closure of all items by the condition owner, regardless of risk ranking score. However, WHC's Hanford Action Tracking System (HATS) is still tracking items as "pending RL verification." WHC personnel expressed uncertainty and inconsistency as to what is expected by RL, indicating that some RL personnel had indicated certain items should not be closed without RL verification, regardless of PPG risk ratings. RL personnel expressed concerns that WHC PPG ratings were often too low, understating the importance of safety issues. RL retains closure authority for RL generated items if so stated by RL, regardless of risk ranking score.
- Contractor procedures do not specify any training or qualification requirements, continuing quality control mechanisms, or oversight activities related to risk ranking to ensure consistency and quality.
- There has been no significant independent oversight of the risk ranking process by the contractors or RL.

The large number of tracking systems, the inconsistency of condition screening for significance, and the failure to keep data bases current inhibits an efficient trending process and fragments the picture of performance, both sitewide and across the various functions of individual contractors, thereby preventing the effective use of adverse condition information as a tool to manage ES&H issues and resources.

- RL entry of RL-identified deficiencies into HATS and CICS were not always entered consistently by RL and "observations" and non-deficiency items were entered that were not specified in transmittal documents as requiring a response from the contractor. During February 1996 RL decided it would no longer make entries directly into HATS, and WHC will make all entries henceforth.

- The new policy/procedure in WHC-CM-1-4 and various facility implementing procedures make an unclear and undefined distinction between "corrective action" and "remedial action", the latter phrase interpreted by the facilities, and implied by the policy, to mean simple actions to fix the individual problems with no cause analysis, the trending risk ranking, or lessons learned to be applied. Further, it is not apparent by procedure or practice that these terms are being consistently or conservatively interpreted by facility managers and staff. In general, internally identified items are not being screened for significance, assigned PPG risk priorities, or addressed considering extent of condition, root cause, and recurrence control and adverse conditions are primarily entered into the formal portion of the HATS database (CAMS) and received risk ranking and root cause determinations, condition identified by internal assessments generally are not. Consequently, potentially significant safety related problems identified internally do not get sufficient formal evaluation and do not get risk ranked or put in data bases that get higher management and RL attention. However, ICF KH has successfully implemented their corrective action management program during the last year and is improving their performance in this area.
- Many other identified adverse conditions, such as from WHC and PNNL safety surveillances, findings from some management assessments, and issues identified by technical assist visits, are not placed into any tracking system and are thus not formally screened, or required to be screened, for significance.
- PNNL personnel are directed to enter items into CATS if the assessment is related to the Price Anderson Amendment Act or the result of independent oversight or external oversight. No evaluation criteria or guidance for entry of self-assessment or other issues has been established and are entered at the discretion of the responsible manager.
- The large number of deficiencies, incomplete data fields, no risk ranking, and high "noise" level of the data in the RL CICS tracking system impedes its use for trending or even routine management of corrective actions.

Although the resolution of individual conditions have been independently evaluated and verified by RL and the contractors, no programmatic audits or assessments have been performed of the corrective action systems currently in use at Hanford.

Failure to establish and implement a comprehensive system of independent and self assessment program that proactively identify, document, and resolve adverse conditions increases ES&H related risks and the probability that these conditions will continue or be repeated. Further, it exposes each facility and the site to sanctions when these conditions are subsequently found by external evaluators. Failure to effectively manage corrective actions at Hanford has significantly impaired a key management tool for monitoring performance and ensuring that conditions adverse to ES&H have been properly addressed regarding risk/prioritization, extent of condition and actions to prevent recurrence, and verification of effectiveness.

GUIDING PRINCIPLE #3. Competence is commensurate with responsibilities.

Criterion 3-1: Staffing and Qualifications

DOE/RL

To provide a clear focus, and to emphasize accountability DOE/RL has assigned the responsibility for meeting the ES&H objectives of the Site to Assistant Managers (AM) who oversee implementation of major projects. AM offices utilize "in-house" ES&H staff, support contractors, the Facility Representatives attached to their offices, and DOE/-RL ES&H Division personnel to meet these responsibilities.

The ES&H Division is a support organization that in addition to providing ES&H matrix capabilities to facilities and programs through AM offices, conducts technical assessments to evaluate contractor performance and supports formulation of site-wide policies and programs. ES&H Division is also directly responsible for managing three sitewide programs: Emergency Preparedness, Hanford Fire Department, and Occupational Medicine programs.

Overall ES&H staffing levels for DOE/RL (within AM Offices and ES&H Divisions) have been fairly stable during the last two years and remain within an

acceptable range. Discipline-specific qualifications vary significantly among individual staff and among managers. On-balance the qualification of the workforce needs to be strengthened. Skill mix problems, and skill shortages in areas such as radiation control, occupational safety, and criticality safety exist, have been recognized by the management, and initiatives such as Excepted Service positions are being considered to correct the situation.

Major issues identified during the evaluation go beyond staffing levels and discipline specific qualifications, and relate to areas where improvements are needed to apply technical resources effectively in a multidisciplinary, multi-organizational environment. Specific shortcomings observed in this regard include lack of:

- System engineering and management skills necessary for understanding system-wide implications of recommendations, events, and trends, and for identifying and focusing on important issues.
- In-depth knowledge of facilities and programs by ES&H Division staff.
- A well-defined process for assignment of matrix personnel.

RL contractors

RL contractors, like contractors at other DOE sites, have suffered recent budget cutbacks and reductions in force. Total contractor employees onboard was reduced from 17,748 in FY-94 to 13,954 in FY-95. These cutbacks have led to reorganization and restructuring activities and ES&H staffing shifts and realignments among contractors, but have not resulted in significant reductions of total ES&H staffing levels.

Pertinent information on staffing levels, structure, and staff qualifications for major ES&H organizations is presented below:

- The WHC Radcon organization consists of over 430 individual managers, exempts, and Radiological Control Technicians (RCT). There are currently over 40 position openings for technical staff and RCTs. Approximately fifty percent of the managers and exempt personnel

have BS or higher technical degrees. During the last year, and in response to criticism by internal and external advisory groups, WHC has defined a path forward for its radiation control program and is in the process of upgrading the qualifications of its workforce. As a result there have been increases in the number of Certified Health Physicists (CHP), and National Registry of Radiation Protection Technologists (NRRPT) since October 95. Even though some progress has been made, correcting systemic weaknesses in supervisory skills, and depth of technical knowledge of first line supervisors and RCTs present significant challenges to WHC management.

- The WHC Safety Department has a staff of over 100 individuals including managers, Industrial Safety, Nuclear Safety, Fire Protection, and Industrial Hygiene professionals. Approximately twenty seven percent of the Safety Department staff have professional certifications. A recent self-assessment conducted by this organization reveals that approximately ninety percent of the employees satisfy WHC job description and DOE Order (5480.20) requirements. Most cases where requirements were not met relate to individuals without a technical degree, but with significant job experience. Two criteria relating to long-range staffing plans and career advancement programs were also explored in the self-assessment, but received lower than average grades.
- At KEH the majority of 26 industrial safety staff are assigned to support the major site projects. A small central organization exists but is mostly focused on company-wide issues and policy. Small teams (typically of the order of 3 to 4 individuals) are assigned to various projects. Team Leaders interviewed displayed extensive field experience; team members experiences range from recent college graduates to individuals with considerable educational and practical experiences, to non-degree individuals with many years of field experience. The team leaders and team members report to the project managers and are charged with monitoring and supporting Kaiser, as well as the sub-contractor workforce. The team resources are stretched thin, especially during construction peaks and, as a result:

- The teams do not have the flexibility to respond to unanticipated occurrences
- The team leaders may not be able to effectively mentor the inexperienced staff
- The teams may not be able to provide sufficient attention to the sub-contractors who may need additional support to ensure the safety of their workforce.

Specific qualification requirements for ES&H staff are spelled out broadly in Kaiser's position descriptions.

- The Bechtel ES&H staff of over 80 individuals is managed as a functional unit but is assigned to various projects as required. ES&H job specific qualifications requirements and necessary training are identified and monitored by the functional organization. Project managers with inputs from functional managers determine project-specific qualification requirements for ES&H staff. Bechtel acquires the majority of its Radcon and IH staffing through outsourcing, but maintains in-house management. The IS group as well as systems engineering and operations capabilities are maintained internally. Overall, allowed staffing levels for Bechtel ES&H is adequate.
- About seventy percent of the PNNL ES&H workforce of approximately 100 individuals are assigned to support projects. A small central organization provides leadership, management and policy support. PNNL has already recognized the need for improving the performance of its ES&H programs and has adopted a strategic approach towards achieving this goal. PNNL progress during the last 1.5 years has been steady, and many improvements have been accomplished. Systemic deficiencies, however, continue and additional time and attention is required. Current staffing levels at PNNL are adequate and staff qualifications were found to be appropriate. PNNL does not have a qualification program for safety and health technical support staff. However, these individuals must meet definite criteria, listed in PNNL position descriptions for occupational safety and health, including working knowledge of regulations, DOE Orders, PNNL policies and standards.

At the Hanford Site, qualification requirements for the workers that belong to unions are well articulated and, in general, crafts are well qualified in their trades. For technical staff and engineers, generic position descriptions for minimum qualification exist and are used by all contractors. The responsibility for definition and documentation of position-specific/facility-specific qualification requirements for exempt employees are assigned to the managers in Hanford contractor organizations. A systematic process for tracking the performance of individual managers in planning and administering the qualification and training of their employees does not currently exist.

Criterion 3-2: Technical Competence and Knowledge of Hazards

Competence is a combination of knowledge and experience that allows good decision-making and safe operations under unusual conditions. It is the ability of managers, technical staff, and especially the workers to recognize and adjust to unanticipated events and occurrences which may modify the work environment and lead to unforeseen hazards not usually faced during routine operations.

DOE/RL

Hazards presented at many of the Hanford facilities are significant, and assurance of health and safety require availability of a broad range of technical qualifications beyond traditional ES&H disciplines. These core competencies, which have already been identified by DOE/RL, include senior level experience and expertise in:

- Managing and overseeing the design, construction and operations of facilities to handle high-level radioactive waste,
- Monitoring contractor activities in handling, storage, and disposal of Special Nuclear Materials, facility stabilization, and maintenance and cleanup of complex nuclear facilities,
- Conduct of Operations, and decommissioning,
- Environmental sciences to do environmental monitoring, interpretation, and modeling to

provide unique site data for compliance with environmental laws and regulations, and

- Risk assessment for nuclear safety, emergency response, environmental and health assessment.

Interviews and examination of employees technical background and experience levels reveal that senior level experience and expertise determined by DOE/RL management to be required in those core competencies are lacking.

Selected upper managers interviewed during the evaluation demonstrated a good degree of technical competence, practical experience, and good understanding of large-scale technological operations. These managers usually bring experiences from military and industry, and clearly understand the importance and the nature of core competencies required for their projects. Such competency and focus is not evident through out the DOE/RL organization. Many managers and their staff are preoccupied with routine and administrative duties.

Two programs within the DOE/RL organization have the potential to go beyond mere establishment of a formal qualification process and make significant contribution towards improving the competency of the workforce. These programs are (1) the implementation of the 93-3 Defense Nuclear Facilities Safety Board (DNFSB) Recommendation, and (2) the qualification standards and processes for the Facility Representatives.

The DOE/RL program for satisfying the requirements of the implementation plan for the provisions of Defense Nuclear Facilities Safety Board Recommendation 93-3 is comprehensive, on schedule, and well-managed by the DOE/RL Office of Training. Out of a population of 314 technical staff, approximately 287 individuals have been determined to be subject to the requirements of this Recommendation. At this time, all of these individuals have identified and completed the appropriate general technical base, functional area and facility/office-specific qualification records. Facility-specific qualification standards have been reviewed by DOE/RL upper management and the records are being revised to reflect their comments. RL/Office of Training routinely tracks the status, and is currently reviewing the qualification records

to determine the type and quantity of training needed to meet the 93-3 schedule.

Out of 287 staff participating in 93-3 implementation over thirty five percent have selected technical and project management as their primary Functional Qualification Standards, with concurrence by their managers. Nearly the same proportion of individuals have selected an ES&H related standard in areas such as: environmental compliance and environmental restoration (52 individuals), Facility Representatives (22 individuals), nuclear safety (11 individuals), occupational safety (8 individuals), radiation protection (6 individuals), environmental, safety and health residents, and industrial hygiene (3 individuals each).

Even though implementation of 93-3 is administratively on solid ground, skewed distribution of core competencies towards management and environmental disciplines, and managers failure to involve subject matter experts in reviewing 93-3 related information, raises concerns about the overall effectiveness of this program.

The Facility Representative qualification training program at RL is comprehensive and meets the qualification standard requirements defined by the 93-3 implementation plan and DOE Order 360.1. The current version of the Facility Representative training program has been in effect since August 1995. Facility Representative trainees are expected to complete their qualification cards within one year of entry into the program. Extensions must be approved by DOE-HQ. Extensive evaluations are performed to ensure that trainees are technically competent and proficient in the assigned facility. They include 30, 80, and 100 percent oral boards, 50 and 100 percent written exams, and final facility walkthroughs.

There are currently 14 DOE/RL Facility Representatives who are fully qualified, five individuals are transferred to new facilities, and seven Facility Representatives are in various stages of training. As of Feb. 5, 1996 there were four vacancies noted. During this evaluation, employees were selected to fill these vacancies.

Overall competence of Facility Representatives who have already been qualified is appropriate. Factors, requiring further attention such that the

effectiveness of the program is not decreased include:

- Insisting on sufficient period of tenure at a given facility
- Allowing adequate resources for qualified individuals to provide mentoring and support to trainees
- Assuring that programmatic functions and technical assistance tasks are not routinely assigned to Facility Representatives
- Assuring that trainees are given enough time to walk down facilities, trace out systems, and study reading materials to shorten their qualification period.

ES&H upper-managers of RL contractors have a good understanding of the competence and qualification issues within their organizations. Individual managers interviewed have appropriate background and site-specific experiences. Technical staff and engineers have generally appropriate educational background and technical knowledge for their job assignments. Localized weaknesses, however, were observed in capabilities to perform root cause analyses, USQ screening, and quality assurance. A positive example of competency encountered during the evaluation relates to the WHC criticality Safety team. These individuals have high credentials, are capable of performing rigorous technical evaluations, and have a clear understanding of criticality hazards at their facilities.

Organizational and staff competence for site operations is generally observed to be adequate. Most Hanford site operations and support personnel take job qualification training as a basis for developing and maintaining technical competence. Operator training is provided through a variety of methods including classroom, on-the-job, and hands-on training. Such training is concluded by practical examination and observations by the supervisors. Instances where job specific training programs were not in place, along with assignment of duties to personnel not appropriately trained to make decisions on safety related matters, were also observed.

Most individuals interviewed, including managers, engineers, and other operational staff expressed an

appropriate level of awareness of health and safety issues and the potential hazards of their facilities. Lessons-learned programs and communication vehicles such as site newsletters, electronic mail, and postings are used extensively to disseminate information to the workforce.

Comprehensive processes for specifying and tracking the technical competence of the exempt staff does not exist within all Hanford contractor organization. In many cases individual managers use their own judgment and experience to define and track the competence of their employees. The process is not always well executed.

In summary, site contractors need to establish a more comprehensive process to:

- Examine current technical knowledge, skills, and abilities of staff
- Determine required training and qualification steps, and track and document progress
- Communicate the progress to staff and summarize the status for management
- Create an environment where competence is recognized and rewarded.

Criterion 3-3: Worker Participation and Empowerment

Worker participation and contribution toward a safer and healthier workplace are being enabled through activities such as accident prevention councils and safety committees, worker involvement in job planning and hazard analysis, stop work authority, DOE's VPP, and employee concerns programs.

Stop Work Authority

Workers exhibit the technical knowledge to recognize workplace hazards, and through endeavors such as behavior-based safety training (taken by over 12,000 employees, virtually the entire WHC/ICF KH/BCSR workforce), workers can recognize potentially unsafe work practices. Employees interviewed indicated no reluctance to suspend operations in order to resolve a safety

question or concern, and they felt that their management was reasonable and would support them. One craftsman stated "my hands are my livelihood and I don't hesitate to raise safety question and get them resolved." Stop work authority is clearly and consistently articulated across the complex, having been promulgated by a joint policy signed by the RL field office manager, and by the presidents of the six contractors at Hanford.

Employee Concerns Programs

RL and each of the contractors have well-developed, effective Employee Concerns Programs with site management visibility and support. All of the site Employee Concerns Managers participate in monthly roundtable meetings to discuss trends, concerns of mutual applicability, and possible solutions. Throughout the site, the programs are well publicized using both electronic and hard copy media. While a majority of worker concerns are resolved at the first line supervisor level, there has been an increase in the number of formal employee concerns filed. See Table A-4. Some of this increase may be attributable to down-sizing and recent reductions in force.

Table A-4. Filed Concerns

ORGANIZATION	NUMBER OF FILED CONCERNS		
	CY 1994	CY 1995	CY 1996 (PROJECTED)
RL ECP	180	276	339
RL CONTRACTORS	314	343	385
TOTAL	494	619	724

The RL Employee Concerns Manager also tracks those cases (referred to as whistle-blower) where Hanford employees have filed complaints under 10 CFR Part 708 "DOE Contractor Employee Protection Program." In an attempt to bring third-party objectivity to potential whistle-blower issues, the Hanford Joint Council has been formed to work towards resolution before issues become whistle-blower category. The university of Washington Department of Public Policy and Management serves on the council. Other council members are:

WHC senior management, a former whistle blower, and community support organizations.

While the Employee Concerns Programs are being run professionally, the site suffers, to some degree, from an undertone of worker distrust. Some managers feel that there are "pockets" of workers who are reluctant to raise concerns for fear of retribution. Those managers stated that some of this reluctance is a carryover from a past culture and some of its stems from the current process modifications such as reengineering process, with its concomitant rebidding for jobs and downsizing.

On June 13, 1995, the Field Office Manager issued a letter to the Hanford contractors that there will be zero tolerance for reprisals against workers who raise concerns. Notwithstanding, the number of cases where retaliation is alleged has risen from a past average of about two per year to about 45 (statistically, in only one case out of 50 can retribution be proven). Similarly, the number of whistle-blower cases is on the rise with the cumulative total, since 1989, numbering 36. Certain categories of Employee Concerns cases and whistle-blower cases are forwarded to the Office of Economic Impact and Diversity or the Office of Contractor Employee Protection. DOE/RL has submitted this information to EH-1 during March 1996.

Avenues for Employee Participation

WHC, BHF, ICF KH, and PNNL management have provided for active worker participation in identifying hazards and in contributing towards solving safety problems through the establishment of safety committees which generally meet monthly. For example, WHC has established a network of participatory councils with the President's Accident Prevention Council (PAPC) at the apex. Each operating division/department has an Accident Prevention Council (APC) and, where divisions are large, there may be several "branches" centered at major buildings. Workers within the APC framework express a sense of teamwork with their managers in acting on safety concerns; frequently using original concepts (e.g., the workers at TWRS built a LO/TO training mockup). In addition to the APCs, there are a number of sitewide technical safety committees, such as those dealing with ALARA, Electrical Safety, and Industrial Hygiene.

The PAPC annual safety goals are developed by the workers themselves. For 1996, these include safety training for managers and workers, sharing of lessons learned and trends among facilities, and sponsoring a 1996 Hanford Safety Exposition. In April 1995, the first Hanford Safety Exposition was conducted with approximately 5,500 workers and their families in attendance over a three-day period. The aim was to promote 24 hour safety awareness through employee participation and management leadership. Employee volunteers planned and prepared for the 80 in-house and community-sponsored educational exhibits and demonstrations. The EXPO provided a sharing of lessons learned and a heightened awareness to those attending relative to safety and health at and away from the workplace. Specific at-risk topics addressed included personal protective clothing, ergonomics, household hazardous waste, recreational safety and fitness programs.

Employee Recognition

Individual WHC, ICF KH, BCSR, HAMTC, and HGU worker contributions to safety and health are eligible for special recognition during the President's Accident Prevention Council meetings. Additionally, significant contributions are eligible for a Merit Award which is reflected in the employee's salary level. Safety mementos (such as mugs, medallions, etc) have largely been eliminated as a result of overhead reductions. ICF KH is an exception and has allocated a quarterly corporate fund of \$105,000 towards a safety incentive program for its employees. For federal employees, a number of safety recognition programs exist under which they may receive a wide variety of gifts (e.g., personal CD players, desk clocks, encased pen and pencil sets). The first is the SAFE BUCK Program where division supervisors recognize employees who identify and help resolve safety issues by awarding them a Safe Buck Award coupon. The coupon is redeemable for one of the type of gifts discussed above. The second is the Thank You Program, where one employee can nominate another for safety contributions at work or off-site (home, traffic, etc.). Similar gifts are awarded. In addition, a Safety Awareness Week stressing a specific safety theme is held quarterly. The upcoming (March 11-15, 1996) theme will be Office Safety Hazards. Employee's who complete an Inspection of Office Safety Hazards form and, in cooperation with their

supervisor, develop a corrective action plan, are eligible for recognition and a gift.

Voluntary Protection Program

Workers and managers interviewed consider the DOE Voluntary Protection Program (VPP) as a catalyst for worker empowerment. This is understandable when one considers that the "heart" of VPP is the recognition that contractors and their employees at all levels possess valuable firsthand knowledge of the processes, materials, and hazards involved in their own operations. This knowledge, combined with the ability to quickly evaluate and address unique hazards, can improve facility safety and health and reap benefits which include fewer injuries, increased employee and management involvement, improved employee morale, improved communications between management and employees, and positive community and other public relations. Applications for VPP status have been developed and submitted by WHC, ICF KH, and BHI. WHC has experienced some delay and frustration with its application reviews by EM. WHC submitted its VPP application in March 1994, and several sets of review comments from the CSO, who hired a consultant to perform the review, seemed uncoordinated. Recently, EM has indicated that it cannot locate the VPP package from WHC. WHC will submit a new copy in which organizational changes are reflected. The application by BHI is under review by EM, and the ICF KH package has completed EM review and is being forwarded to EH. PNNL has yet to submit a VPP application because they have made a significant shift in management structure and philosophy. These changes will take some time to "institutionalize" and allow the Laboratory to benchmark VPP elements before considering an application for VPP status. PNNL is planning to consult with ER and with other Labs, such as Brookhaven National Laboratory, and with private sector laboratories on the applicability of VPP to laboratory operations.

Employee Contributions to Safe Work Planning

The experience of workers and craftsmen and their direct knowledge of hazards are beginning to be utilized in the preparation of Job Hazard Analyses and in work package development as part of re-engineering, and especially in the Enhanced Work

Planning Demonstration Pilot Project which is being implemented at the K Basins, PUREX and Tank Farms (similar processes exist within BHF and ICF KH). Each of these processes utilize teams for work planning and performance. First line supervisors have expressed the feeling that the simplification of work packages, which were formerly very large and complex, will enhance safety because the important safety information is not buried in a huge document and workers will be inclined to closely follow the improved procedures. As a result of workers walking down the draft packages, they are confident that they are doable and safe. Typical teams for work planning include the planners, field engineers, craftsmen and the appropriate support specialists such as health physicists, industrial safety engineers and radiological control technicians. During the February 29th session of the PAPC, one bargaining unit member commented on increased worker participation and stated "pride and dignity are being returned to the craftsmen."

The full values of VPP and Enhanced Work Planning, while holding great potential, are yet to be realized because these programs are in early stages of development.

Criterion 3-4: Training Program

At Hanford, the structure of training organizations vary significantly among contractors ranging from a simple training coordination model (Bechtel and Kaiser) to a fairly complex central and facility-specific models (WHC and PNNL). Figure XX depicts the relationships among these programs. Contracts, memoranda of understanding, partnerships, cost effectiveness, and availability and convenience are the basis for these relationships. Westinghouse Hanford Company serves the majority of DOE, Bechtel, and Kaiser training needs, some of PNNL's needs, and is the most extensive, and mature training organization at Hanford. Relative extent of training efforts conducted by each organization are also shown in Figure xx. Cost figures are estimates provided by each organization. The WHC training organization is divided into a central group (TRS) and facility-specific groups (approximately 12). Whereas TRS provides site-wide cross-cutting training to its customers; the WHC facility groups provide specialized training. Similarly, Bechtel, and Kaiser provide company/project-specific training to

their employees. PNNL has adopted a structure similar to WHC where the core training group focuses its activities on company and functional areas and each facility focuses on laboratory-specific needs.

DOE/RL Training Program

The DOE/RL training and qualification program is well-documented, generally meets the requirements of DOE 360.1, and is effective in identifying, locating and procuring training for Federal employees. However, improvements in implementation are needed to ensure that managers take an active role in the training process.

The RL Office of Training (OTR) is responsible for managing training and qualification of Federal employees and providing oversight of RL and contractor training programs. OTR is effectively meeting these responsibilities, and the 93-3 implementation planning effort which is on schedule moving towards compliance by 1998. Automated databases and analysis tools such as spreadsheets are used for tracking training, skills, and qualifications.

Since mid-1994, the RL Office of Training has made significant improvements in its effectiveness, acceptance of oversight by RL and contractors, management of the office, and technical competence.

- The Office of Training now reports to the Site Manager. As a direct report, prompt management attention can be provided to address training issues in the DOE and contractor organizations.
- The expertise of the office has increased with the hire of four new personnel who possess extensive navy and commercial nuclear power and training experience.

Overall, the staff of the Office of Training has the experience, skills, knowledge and commitment to manage the RL employee training and qualification program and to oversee the contractors' programs. Several notable activities were observed by the team.

- Training evaluations are succinct, comprehensive, and are perceived by RL and contractors as providing added value and worthwhile lessons learned.
- Evaluations accurately identify problem areas and good practices, and OTR tracks closure of findings and deficiencies.
- Assessment plans are shared with the assessed organization to focus the discussions on training-related issues and to identify the documentation that OTR requires for review.

Recently, two Federal evaluators at OTR responsible for contractor and RL oversight accepted assignments as Facility Representatives. This will have an impact on the assessment and surveillance schedule unless prompt management support is provided to quickly fill these positions with equally competent individuals.

RL line managers are responsible for implementing and updating the training and qualification program. However, they are not actively participating in proper implementation of the program. The Training Requirements Matrix is used by managers to identify the training needed by employees both for required qualifications and for professional development. OTR compiles the information and forecasts training budgets, locates training to meet the requirements, and verifies completion of 93-3 related activities. Two factors requiring further attention include:

- OTR personnel believe that the TRM database is only partially accurate; RL activities in improving the quality of TRMs are essential.
- Only 2 of 33 divisions developed annual training plans which are required by DOE 360.1 and are needed by OTR to develop the RL training budget and plan.

To help increase awareness of the importance of TRMs and annual training plans, OTR evaluators are educating managers and division training coordinators about the Training and Qualification process while conducting their evaluations.

A new approach to training workers in hazardous waste operations and emergency response has been

developed at the Hazardous Materials Management and Emergency Response (HAMMER) Training and Education Center. This DOE facility provides state-of-the-art, hands-on hazardous material training in a cost-effective manner. HAMMER is presently funded by Congress and provides HazWoper and emergency response training to Hanford Site workers.

A Board of Directors consisting of DOE, Hanford Site organizations, Federal and state agencies, labor unions, and private industry guide and manage the activities at HAMMER. HAMMER is located in a temporary facility until the permanent facility is completed in 1997. The new facility will have mockups for waste storage, decontamination, cleanup sites, hazardous material transportation and emergency response that trainers can use to simulate potential accidents under various conditions. To keep costs down, HAMMER will have a small core staff and deliver training using resources provided by the partnership. HAMMER is a notable example of utilizing existing training expertise combined with hands-on training to promote worker health and safety. This facility is a demonstration model for training throughout the DOE complex.

Westinghouse Hanford Company Training

WHC conducts a significant portion of the training provided at the Hanford Site. TRS and the facility--specific training groups emphasize performance-based training; however, the systematic approach to the training process is not fully implemented at the facility level.

WHC training groups were assigned to facilities less than two years ago and therefore, are not fully developed or supported by line managers. TRS and the facility training groups participate in training committees and advisory boards to discuss and resolve training-related issues and provide support as needed. These meetings are valuable, and foster good communications, and working relationship between the central and facility training groups.

Generally, WHC training programs meet applicable requirements, are formalized, and are based on best industry practices and modern instructional design methods. Implementation progress at the facility level is mixed; selected facility training groups need

to improve their implementation to better meet DOE training requirements. For example, the requirements of DOE Order 5480.18B, "Accreditation of Performance-Based Training For Category A Reactors and Nuclear Facilities," are not being met by Tank Farms facility. Tank Farms is the only Hanford facility that is required to be accredited. In 1991, WHC submitted a Training Program Accreditation Package (TPAP) for Tank Farms to DOE-HQ. In 1995, OTR requested a copy of the package from DOE-HQ to determine status of accreditation and was told the package was lost. Because of numerous changes in the TWRS organization and related DNFSB findings, WHC was asked to rewrite the TPAP and submit it to RL by April 1996.

The path forward for Tank Farms, and even broader DOE training accreditation, is uncertain at this time, since accreditation may not be required within the framework of the necessary and sufficient approach. In a letter to Mr. John E. Carroll of the Training Accreditation Board on January 22, 1996, Dr. Tara O'Toole states that actions and programs the Department is putting in place, will more effectively, and efficiently achieve the objectives of the "former accreditation process." DOE-HQ Human Resources organization is currently reviewing the situation, and since the Secretary of Energy has not formally rescinded the requirements of DOE 5480.18B, RL believes that WHC should continue to acquire accreditation for the Tank Farms.

The WHC Training Standards Manual and implementing procedures include specific elements for a systematic approach to training which meets the requirements of Chapter I.7 of DOE Order 5480-.20A, "Personnel Selection, Qualification, and Training Requirements For DOE Nuclear Facilities." WHC Training Implementation Matrices, which identify training, qualification, and certification requirements for individuals, have been completed, have been approved by RL, and are used to help develop training program requirements.

Training program descriptions and qualification standards at WHC-run facilities have been developed and implemented to define training requirements for nuclear operators, shift managers, shift technical engineers, and shift technical advisors. Training programs for power operators

have not been completed because of union concerns and contract language. By contract, power operators are not required to take "job-jeopardy" exams. This eliminates the ability of a training organization to determine whether a power operator has successfully acquired the required knowledge for his position. RL is monitoring the negotiations but has not developed a position on how to quickly close the issue.

A consistent approach to train and enhance the technical skills and facility knowledge of engineering support was not evident. Training for system and cognizant engineers is informally managed by each facility or engineering organization. Where programs existed, the quality was mixed.

TRS provides most of the crosscutting training conducted at the Hanford Site. This organization is mature, has knowledgeable and experienced instructors and managers, provides performance-based training that focuses on training to actual job tasks and provides workers with the knowledge and flexibility needed to deal with unexpected conditions. Safety policies and goals are integrated into each training program and in TRS personnel performance appraisals.

TRS is striving to be a center of excellence and has implemented several notable practices.

- The conduct and development of training is defined by a charter, policy statements, instructor codes of conduct, and a sitewide training standards manual. TRS and all WHC-managed facilities have developed implementing procedures that reflect minimum requirements specified in the sitewide manual and tailored to each organization's specific differences.
- Extensive use of mockups, simulators, models and actual equipment provide effective learning tools for students as evident in student and course evaluation sheets. The Hanford Training Center is a renovated warehouse and does not provide an optimal learning environment; however, the training staff incorporates and continually develops innovative methods to overcome many learning obstacles. For example, a large portion of maintenance training is performed at the deactivated FMEF which has

sufficient room and equipment available for TRS use.

- TRS is evaluating the use of virtual reality in training to provide more effective delivery and realism where facility conditions prohibit use of installed equipment.
- TRS evaluation of the conduct and effectiveness of training is extensive. Training courses and instructors are evaluated in many ways.
 - Student course and instructor evaluation forms provided at the end of each course
 - Student surveys at some time after training was conducted
 - Periodical evaluations by peer instructors or by training managers on a quarterly or annual basis
 - Self-assessments conducted by an internal assessment group
 - Assessments by external independent consultants.

Results are incorporated in instructor continuing training and performance appraisals, and course and lesson plan revisions. Further, RL provides results of its training assessments to WHC training organizations to correct identified deficiencies.

- TRS uses an interpretive authority committee to review and analyze the impact and effect of regulatory and contractual requirements on training. Further, it is developing a database that links courses to those requirements. Managers can then prioritize, select, and schedule training courses for workers to qualify for their job positions.
- WHC has partnerships with several universities/colleges to develop and provide training in several areas including vocational instructor certification, RadWorker I&II initial training, and basic skills for illiterate workers.
- TRS has developed a sitewide automated database, TMX, for managers to define, forecast, and track employee training requirements and schedule training. Following are several important features provided by TMX:

- Managers can enter position training plans, entry requirements, training course requirements, and designate which training courses meet mandated, directed, or professional development requirements.
- TMX allows managers to determine if an employee has met all requirements to qualify for a job position.
- The system is secured to prevent unauthorized access to employee training records.
- A variety of reports are available to managers who can track status of completed training, retraining dates, no-shows, and alternate training courses that meet position requirements.

A deficiency noted during the evaluation was that the facility managers interviewed could not easily generate a qualification summary report for all their workers.

Overall, the conduct, structure, content and delivery of training provided by WHC is acceptable but improvements are needed at the facilities to bring them to a level equivalent to that of TRS. Further, management involvement in training needs to be strengthened to ensure the content and quality of training is pertinent to the job tasks a worker is expected to perform. In many cases, training for managers and supervisors on the training process, TMX, and responsibilities may improve the situation.

Contractor Training Organizations

PNNL's rationale for creating its own training organization is to minimize costs and to develop training it believes WHC cannot provide. Bechtel is considering expanding its training organization for similar reasons. At this time it is not clear whether this approach will lead to improved training or result in major cost reduction for this site.

With the exception of WHC, contractor training organizations are not using comprehensive evaluations to assess the effectiveness of training they provide. Evaluations tend to be post-course student questionnaire's or informal critiques.

Management Involvement

Contractors line managers involvement in evaluating the technical and instructional skills of training instructors needs to be strengthened. For example, WHC line management needs to be more proactive in evaluating the effectiveness and technical content of the training provided by TRS or the facility training groups. Surveys indicate that there is a gap in the perceived value and effectiveness of training between managers and their supervisors and workers. Bechtel

managers/supervisors provide comments only if they attend training required by their job position. PNNL building and facility managers do not consistently assess training.

Managers are responsible for the content and quality of training, and should utilize the most effective methods to verify quality, safety, and expected outcomes. Evaluation is a fundamental and necessary process in the systematic approach to training.

This page intentionally left blank.

APPENDIX B - EVALUATION APPROACH AND TEAM COMPOSITION

EVALUATION PRINCIPLES AND CRITERIA

The three applicable fundamental principles for an effective safety management program are discussed below.

Principle #1 - Line managers are responsible and accountable for safety.

Organizations that have effective safety management programs place accountability and responsibility for safety with line managers. Accordingly, line management personnel must ensure that the safety management program includes safety policies and goals that are clearly articulated and communicated; well defined responsibilities and authorities; effective management systems to identify, analyze, prioritize, and mitigate risks; and a process for ensuring that management is accountable for its safety performance.

The criteria for Principle #1 are summarized in Figure B-1.

Principle #2 - Comprehensive requirements exist, are appropriate, and are executed.

An effective safety management system must include processes to identify, communicate, execute, and monitor all applicable requirements, including Federal and state regulations as well as DOE requirements. Accordingly, responsibility for managing requirements must be established, a hazards analysis process must be implemented and applicable requirements identified and translated to procedures, procedures must be implemented by personnel in the facilities, and systems to assess compliance and effectiveness and to correct non-compliant conditions must be in place.

DOE is in the midst of a significant change in its approach to analyzing hazards and identifying applicable requirements that must be implemented to control those hazards. Most notably, DOE is transitioning from orders to rules. The criteria for Principle #2 are intended to be sufficiently flexible to encompass all of the current and developing approaches to analyzing hazards and identifying appropriate requirements.

The criteria for Principle #2 are summarized in Figure B-2. The following paragraphs clarify the scope of the individual criteria under this principle.

The first criterion focuses on the management functions that are necessary to implement hazards analysis processes. Included in this criterion are functions such as identifying individuals and teams to conduct hazards analyses at various facilities, assuring that the necessary resources are available, prioritizing activities, reviewing progress and status, maintaining documentation, establishing configuration control, evaluating and approving site-specific processes, and determining whether expectations are being met. In short, the first criterion focuses on the infrastructure underlying the second principle.

The second criterion focuses on the effectiveness of the actual process for analyzing hazards and identifying requirements. It encompasses the processes for translating the applicable requirements to site- and facility-specific procedures, and for updating those procedures as conditions change. The emphasis is on whether the processes used at the site are achieving the desired goal, which is a set of requirements and procedures that, if implemented, will effectively control the hazards. Also important is whether the site has a formal, current authorization basis for its facilities and whether the site is meeting established commitments for developing such an authorization basis.

<p align="center"><i>Principle #1 - Line managers are responsible and accountable for safety.</i></p>
<p align="center">Criterion 1-1: Clear Safety Policies and Goals</p> <p>Line management implements effective safety policy and goals that reflect Departmental policies and industry standards and assures a safety culture that permeates every level of the organization.</p>
<p align="center">Criterion 1-2: Defined Responsibilities and Authorities</p> <p>Line managers are responsible and accountable for ensuring that DOE facility operations and work practices are performed in a manner that provides adequate protection to worker safety and health, the public, and the environment. Accordingly, line managers must ensure that:</p> <ul style="list-style-type: none"> ■ A clear division of responsibilities is established and communicated. ■ Line managers have the authority to make and implement decisions regarding ES&H that are commensurate with their responsibilities. ■ There are clear mechanisms throughout the line organizations for adjudicating disputes among line managers where discrepancies are believed to exist between work goals and ES&H management needs.
<p align="center">Criterion 1-3: Project and Resource Management Systems</p> <p>Decision makers at appropriate levels of the organization must be capable of understanding and synthesizing program goals and ES&H risks in order to effectively deploy resources adequate to address both. Line managers must manage safety and its attainment by establishing management information systems to ensure that:</p> <ul style="list-style-type: none"> ■ Hazards are analyzed and understood. ■ Appropriate hazard mitigation actions are identified and are in place.
<p align="center">Criterion 1-4: Line Management Accountability for Performance</p> <p>Line managers are accountable for ES&H performance. Performance should be explicitly tracked and measured, and inadequate performance should have visible and meaningful consequences. Line managers must execute actions to attain and continuously improve the safety of their operations by ensuring that:</p> <ul style="list-style-type: none"> ■ Safety-related matters are reviewed, monitored, and audited on a regular basis. ■ Findings resulting from these reviews, monitoring activities, and audits are resolved in a timely manner.

Figure B-1. Criteria for Principle #1

Principle #2 - Comprehensive requirements exist, are appropriate, and are executed.

Criterion 2-1: Requirements Management

Processes must in place to ensure that requirements are identified, transmitted, and implemented, and that they provide adequate protection to worker safety and health, the public, and the environment.

Criterion 2-2: Hazards Analysis

Hazards generally change as a facility cycles through the phases of design, construction, operation and maintenance, decommissioning and decontamination, and environmental restoration. It is thus important to continually analyze and assess hazards in order to identify the relative significance and application of Department requirements. To effectively mitigate hazards, line managers must ensure that:

- Requirements are established that are commensurate with hazards throughout the life cycle of the facility.
- Internal requirements are based on hazards analyses and, when implemented, are sufficient to ensure safety.
- Site-specific implementation plans and associated operating procedures define standards that will be used to comply with applicable safety requirements.
- The site is in compliance with applicable Federal and state statutes and Departmental policy and requirements.

Criterion 2-3: Implementation of Requirements

Line managers are responsible for ensuring that programs are implemented in compliance with defined requirements.

Criterion 2-4: Assessment Programs

Line management must establish and implement effective methodologies to monitor, review, and evaluate adherence to all applicable Departmental requirements and industry standards for safety and to achieve timely correction where warranted.

Figure B-2. Criteria for Principle #2

The third criterion focuses on implementation of requirements sitewide and at specific facilities. The emphasis is on whether the requirements are understood at the working level, and implemented as intended.

The fourth criterion encompasses the various programs that assess compliance and effectiveness and provide feedback to line management. These include self-assessments, surveillances, audits, quality assurance, management walk-throughs, and similar formal and informal measures.

Principle #3 - Competence is commensurate with responsibilities.

A fully functioning safety management system will have workers and managers who are technically competent to perform their jobs and who are appropriately educated and knowledgeable of the hazards associated with site operations. Management must assure that effective training programs are in place and that sufficient qualified staff are available. Workers must have the technical capability to recognize and respond to workplace hazards. Active worker participation in maintaining and improving the safety and health of workers, the public, and the environment, including workers' ability to stop work when unsafe practices are recognized, is essential.

The criteria for Principle #3 are summarized in Figure B-3.

Figure B-4 presents an overview of the stages of the evaluation process and examples of the activities that were conducted in each stage.

EVALUATION METHODS

Each of the guiding principles that constitute the basis for establishing an effective safety management program is a crucial element of a process to ensure that DOE-controlled operations are performed in a manner that will protect workers, the public, and the environment. Using these principles and their associated criteria to evaluate safety management program effectiveness requires careful consideration of the nature of the specific activity or facility being reviewed, its relationship with and impact on other activities and facilities, its life cycle phase, and the risk it presents to adversely affecting ES&H goals.

While the significance and application of each principle and its associated criteria may vary by circumstance, it is imperative that the implications of each principle for effective safety management be weighed and considered on the basis of hazards and risks to workers, the public, and the environment.

The guiding principles are interrelated and mutually supportive elements of the overall safety management system. Clear articulation and communication of lines of authority and responsibility for safety must consider and correlate with the establishment and implementation of appropriate requirements. Personnel responsible for executing these requirements must understand the hazards and their roles in controlling the hazards, and must be competent to perform their assigned duties. Hence, the evaluation of the safety management system must consider the guiding principles both individually and in concert.

The process for evaluating the effectiveness of each guiding principle is as follows.

First, the evaluation results are sorted and binned according to the individual criteria, and each criterion is evaluated and rated individually. Next, each principle is evaluated according to the associated criteria, considered separately and collectively—that is, the evaluations of individual criteria results are "rolled up" to a higher level evaluation of the individual guiding principles.

Finally, the overall safety management program is evaluated and rated by "rolling up" the evaluation of the individual guiding principles.

The rollup process is not a mechanical or numerical scoring exercise. Rather, it is a deliberative process involving all levels of the Oversight evaluation team, from the inspectors who examine individual facilities and topics to the evaluation team management and the Deputy

Principle #3 - Competence is commensurate with responsibilities.

Criterion 3-1: Staffing and Qualifications

The organization supports effective safety management by assuring appropriate levels of staffing and competence at every level. The organization has in place the means to:

- Determine the appropriate levels of staffing, experience, and training for each function, including consideration of responsibilities, activities, hazards, and schedules.
- Assure that subcontractors employed on site are adequately trained and qualified on job tasks, hazards, and DOE and contractor safety policies and requirements.
- Clearly identify vertical and horizontal lines of interface, communication, and support.
- Provide managers and supervisors with sufficient authority, staffing, and support to implement assigned responsibilities, analyses, and decisions.
- Develop and implement strategies for recruitment and retention of competent personnel.

Criterion 3-2: Technical Competence and Knowledge of Hazards

Workers and managers are technically competent to perform their jobs and are appropriately educated and knowledgeable of the hazards associated with site operations. Line managers must ensure that:

- Workers have the technical capability to recognize and respond appropriately to workplace hazards.
- Management, technical staff, and workers have the necessary levels of education, training, and experience.

Criterion 3-3: Worker Participation and Empowerment

Line managers recognize that active participation by workers is essential in maintaining and improving protection to worker safety and health, the public, and the environment. Therefore, line managers must ensure that:

- Workers and managers are empowered to take appropriate action in the face of hazards encountered during normal and emergency conditions, including the right to refuse unsafe work assignments.
- Processes for raising safety issues are established.
- Incentives are in place to promote a safety-conscious culture and worker participation and involvement in safety management.

Criterion 3-4: Training Programs

Line managers must establish and implement processes to ensure that training programs effectively measure and improve performance, and identify additional training needs.

Figure B-3. Criteria for Principle #3

Figure B-4. Evaluation Activities

Assistant Secretary for Oversight. The rollout evaluations consider:

- Whether risks to ES&H currently exist or will exist in the future if present circumstances remain unchecked
- Whether the risks are unique to a specific criterion, principle, activity, or facility
- The synergistic effects of two or more principles or criteria
- Initiatives that are in progress or are planned, and their expected results
- The impact that the level of adherence to a specific principle or criterion has on the effectiveness of the overall safety management program.

In practice, the evaluation process involves a number of iterations to assure that the results are valid and representative of the RL safety management program.

At all stages of the process, the preliminary results are shared with representatives of RL. Their comments on the factual accuracy and completeness of the data are used to determine the validity of the data and guide additional data collection efforts as appropriate.

EVALUATION PROCESS

The Office of Oversight's evaluation process measures the effectiveness of DOE and contractor line management in achieving ES&H objectives. The goal of the approach used is to fairly and accurately assess the effectiveness of a site's overall safety management program in a way that provides value to line management.

This process focuses on safety management in the context of the guiding principles rather than on serial evaluations of individual issues or technical disciplines. The Office of Oversight strives to provide a balanced assessment of performance, emphasizing strengths as well as weaknesses. Rather than a list of non-compliances or specific deficiencies, evaluation results discuss root causes,

systemic weaknesses, obstacles to improvement, and suggestions for approaching solutions. The program actively seeks and incorporates the insights and concerns of line management, workers, regulatory bodies, and other interested parties.

Evaluation of the safety management program at Hanford was based on an assessment of the effectiveness with which line management executes the guiding principles. Measurement of the effectiveness of implementation of ES&H requirements was guided by the criteria associated with the safety management guiding principles.

The evaluation was conducted according to formal protocols and procedures, including an Appraisal Process Guide providing the general procedures used by the Oversight program for conducting inspections and reviews, and a Safety Management Evaluation Plan, outlining the scope and conduct of the evaluation process. Training sessions were conducted to ensure that all team members were informed of the evaluation objectives, procedures, and methods. The evaluation team collected data through interviews, document reviews, walkdowns, observation of activities, and performance testing. Over 100 interviews were conducted with Headquarters; RL and contractor managers, technical staff, and hourly workers; and union representatives.

During the planning process, the Oversight team identified a number of focus areas: employee involvement, subcontractor safety, performance, critical skills, hazards analysis, and re-engineering. These areas were reviewed as applicable at RL and contractors and at each facility.

Templates for collating data on a daily basis were used as an internal team communication and analysis tool. Weaknesses, strengths, and other indicators were entered into the template on a daily basis and used for coordinating the flow of data. The template was designed for ease of analysis relative to a specific guiding principle and associated criteria. This analysis formed the basis for the integration of information, identification of management issues, ratings for performance under each guiding principle and its criteria, and writing the evaluation report. The analysis of data also provided the basis for redirecting the team during the inspection, as necessary. The information was evaluated and

analyzed on a daily basis by evaluation team management and the management team.

Emphasis throughout the evaluation was on ensuring that data collected were valid and accurate during all phases of the evaluation. Key facts and issues were reviewed daily with site points of contact to verify their accuracy. Team management provided daily morning debriefings to site management on emerging issues.

Issue forms were generated when sufficient information was developed to identify a significant safety management issue. These forms identified the nature of the issue, observed conditions relating to the issue, the basis for the issue, and the safety significance. Issue forms were approved by the Team Leader before being provided to DOE field office management for response and followup. Based on observations and/or issues generated, the team analyzed the effectiveness of each criterion and associated attributes for each of the guiding principles. Results and conclusions were documented and ratings assigned. The team evaluated potential options for improving operations and generated candidate actions for enhancing the Hanford safety management system. Finally, the report was reviewed by a management review board consisting of senior analysts and managers who ensured that the reported results reflected objectivity, comprehensive analysis, and supportable conclusions. The results of these efforts were provided in a draft report to DOE management for factual validation at the exit briefing.

TEAM COMPOSITION

To reflect the emphasis placed on the three guiding principles of safety management, a core group of nine safety management specialists evaluated the application of these principles at the Hanford Site, with three specialists focusing on each of the three guiding principles.

Two additional teams were designated to evaluate safety management at the facility level. Facility Safety Management Team A evaluated the facilities and implementing programs falling within the scope of the Tank Waste Remediation System, Waste Management, and Facility Transition Projects (i.e., the Tank Farms, K Basins, PFP, and B Plant/WESF). Facility Safety Management Team B evaluated the facilities and implementing programs falling within the scope of the Environmental Restoration and Technology Management (N Reactor and Buildings 324/325) as well as construction activities. In addition, two specialists were assigned to evaluate the Hanford Site occupational health/medical surveillance program.

To facilitate coordination and communication between the groups, a safety management specialist from each of the three guiding principle areas was assigned to coordinate with Team A; similarly, another safety management specialist from each of the three guiding principle areas worked with Team B. This functional alignment ensured the overall development of appropriate and sufficient information to assess the overall effectiveness of safety management at Hanford, identification of emerging management issues requiring followup at the facility level, and evaluating facility-specific safety management issues having sitewide implications.

Team composition is listed on the next page.

Deputy Assistant Secretary for Oversight

Glenn S. Podonsky

Associate Deputy Assistant Secretary

Neal Goldenberg

Director, Office of ES&H Evaluations

S. David Stadler

Evaluation Team Management

S. David Stadler

Michael A. Kilpatrick

Dean C. Hickman (Integration Advisor)

Management Systems**Management Responsibility**

Thomas O'Connor

Matthew Allen

David Berkey

Comprehensive Requirements

Patricia R. Worthington

Robert Compton

Roger Griebe

Competence Commensurate with Responsibility

Ali Ghovanlou

Thomas Kyriakakis

Frank Cicchetto

Occupational Health/Medical Surveillance

Harry Pettengill

Marvin Mielke

Facility Safety Management Team A

Thomas Staker (Team Leader)

Brad Davy (Essential Systems)

Spyros Traiforos (Essential Systems)

Gerald Toomey (Essential Systems)

Edward Stafford (Essential Systems)

Kathy McCarty (Radiation Protection)

Tony Weadock (Radiation Protection)

Robert Cullison (Industrial Hygiene/Safety)

James Lockridge (Industrial Hygiene/Safety)

John Psaras (Process Safety)

Paul Lin (Process Safety)

Philip Grant (Process Safety)

Glenn Whan (Criticality Safety)

Donald Neal (Waste Management)

William Miller (Conduct of Operations)

David Allard (Radiation Protection)

Facility Safety Management Team B

Robert Freeman (Team Leader)

Rob Monroe (Radiation Protection)

Robin Siskel (Radiation Protection)

Michael Tuggle (Industrial Hygiene/Safety)

Ivon Fergus (Criticality Safety)

Victor Crawford (Waste Management)

Karl Feintuch (Quality Assurance)

John Cece (Conduct of Operations)

Paul Wu (Decontamination and

Decommissioning)

Richard Green (Decontamination and

Decommissioning)

Robert Crowley (Construction Safety)

Douglass Abramson (Construction Safety)

Prakash Kunjeer (Construction Safety)

Administrative Team

Mary Anne Sirk

Tracey Blank

Tom Davis

Kathy Moore

Amy Shepard

This page intentionally left blank.